(FILE 'HOME' ENTERED AT 07:43:32 ON 06 SEP 2007)

FILE 'REGISTRY' ENTERED AT 07:43:39 ON 06 SEP 2007

L1 STRUCTURE UPLOADED

L2 34 S L1 SSS FULL

FILE 'CAPLUS' ENTERED AT 07:43:57 ON 06 SEP 2007 L3 75 S L2

FILE 'STNGUIDE' ENTERED AT 07:44:19 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:44:50 ON 06 SEP 2007

FILE 'STNGUIDE' ENTERED AT 07:45:15 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:46:22 ON 06 SEP 2007

L4 STRUCTURE UPLOADED

L5 3 S L4 SAM SUB=L2

L6 11 S L4 SSS FULL SUB=L2

L7 23 S L2 NOT L6

FILE 'CAPLUS' ENTERED AT 07:46:57 ON 06 SEP 2007 L8 72 S L7

FILE 'REGISTRY' ENTERED AT 07:47:02 ON 06 SEP 2007

FILE 'STNGUIDE' ENTERED AT 07:47:23 ON 06 SEP 2007

FILE 'REGISTRY' ENTERED AT 07:48:11 ON 06 SEP 2007

FILE 'CAPLUS' ENTERED AT 07:48:25 ON 06 SEP 2007 L9 63 S L8 AND PREP/RL

FILE 'REGISTRY' ENTERED AT 07:49:06 ON 06 SEP 2007

FILE 'CAPLUS' ENTERED AT 07:49:27 ON 06 SEP 2007 2 S US200!-541021/APPS

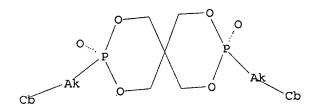
L10 2 S US200!-5410 L11 62 S L9 NOT L10

FILE 'REGISTRY' ENTERED AT 07:50:09 ON 06 SEP 2007

=> d l1

L1 HAS NO ANSWERS

L1 STR



Structure attributes must be viewed using STN Express query preparation.

=> d 14

L4 HAS NO ANSWERS

L4

STR

Structure attributes must be viewed using STN Express query preparation.

```
chain nodes :
    12 13 14 15 17 18
ring nodes :
    1 2 3 4 5 6 7 8 9 10 11
chain bonds :
    5-13 5-15 9-12 9-14 14-18 15-17
ring bonds :
    1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 7-8 8-9 9-10 10-11
exact/norm bonds :
    1-2 \quad 1-6 \quad 2-3 \quad 2-7 \quad 2-11 \quad 3-4 \quad 4-5 \quad 5-6 \quad 5-13 \quad 5-15 \quad 7-8 \quad 8-9 \quad 9-10 \quad 9-12 \quad 9-14 \quad 10-11
    14-18 15-17
isolated ring systems :
    containing 1 :
```

```
Match level:
   1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom 10:Atom 11:Atom
   12:CLASS 13:CLASS 14:CLASS 15:CLASS 17:Atom 18:Atom

Generic attributes:
   17:
   Saturation : Unsaturated
```

18:
Saturation : Unsaturated

```
12 13 14 15 17 18 19 20

ring nodes:

1 2 3 4 5 6 7 8 9 10 11

chain bonds:

5-13 5-15 9-12 9-14 14-18 14-20 15-17 15-19

ring bonds:

1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 7-8 8-9 9-10 10-11

exact/norm bonds:

1-2 1-6 2-3 2-7 2-11 3-4 4-5 5-6 5-13 5-15 7-8 8-9 9-10 9-12 9-14 10911

14-18 14-20 15-17 15-19

isolated ring systems:

containing 1:
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1:Atom 2:Atom 3:Atom 4:Atom 5:Atom 6:Atom 7:Atom 8:Atom 9:Atom 10:Atom 11:Atom

12:CLASS 13:CLASS 14:CLASS 15:CLASS 17:Atom 18:Atom 19:CLASS 20:CLASS

: Unsaturated

: Unsaturated

Generic attributes :

Saturation

Saturation

17:

18:

ANSHER 1-0F-62 CAPLUST COPYRIGHT 20077ACSFONESTN 200c-33:10 CAPIUS UII-text
145:165948
Halogen-free Liame-recardant and heat-resistant epoxy resin compositions and their laminates
Yamanaka, Katsuhiro
Reinin-chomicostantedom Sapan
Jpn. Kokai Tokkyo Koho, 23 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

PI JP 2006193548
PRAI JP 2005-3637
OS MARPAT 145

20060727

JP 2005-3637

X X .

MARPAT 145:168548

The compns. contain (A) 100 parts epoxy resins, (B) 1-200 parts hardeners, and (C) 0.1-200 parts organophosphorus compds. represented by the general formula 1 (X1, X2 = aromatic group-substituted alkyl represented by the general formula formula (AL) (Ar)n; L = C1-5 aliphatic hydrocarbyl; Ar = Ph, naphthyl, or anthryl whose aromatic may be substituted; n = 1-3 integer; Ar bonds to any C atom in AL). Thus, a 50%-nonvolatile MEK-based varnish comprising Epicion N 770 (A) 100. dicyandiamide 5.5, 2.4,8.10-tetraoxa-3,9-diphosphaspiro[5,5] undecene 3,9-dibenzyl-3,9-dioxide 30, and 2-ethyl-4-methylimidazole 0.1 part was impregnated into glass cloths to give prepregs with resin content 44.4%, 8 pieces of which were stacked together, sandwiched with electrolytic Cu foils, and hot pressed to give a 1.6-mm thick Cu-clad laminate showing flame retardance V-0 (UL-94) and good solder heat resistance (JIS C 6481). with electrolytic Cu foils, and hot pressed to give a 1.6-mm thick Cu-clad laminate showing flame retardance V-0 (UL-94) and good solder heat resista (JIS C 6481), 20544-27-0P 62294-92-3P 475101-74-7P 475101-76-9P RL: IMP (Industrial manufacture), MOA (Modifier or additive use), PREP foreparation), USES (Uses) (flame retardant, halogen-free flame-retardant and heat-resistant epoxy resin compns. and their Cu clad laminates) 20544-37-0 CAPLUS 2.4,8,10-Tetracax-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

Results 10/541021 3 of 76 PRAI WO 2003-JP15799 20031210 MARPAT 143:79071

A styrene resin composition which is excellent in thermal stability, hue, flowability, and heat resistance and further has flame retardancy; and a molded article formed therefrom which has an excellent appearance. The resin composition comprises (A) 100 parts styrene resins, [8] 0-100 parts polyphenylene ether resins, and (C) 1-100 parts organophosphorus compds. represented formula (I), wherein Arl and Ar 2 - Ph or substituted phenyl; satisfying the following requirements (i) the amount of the residue left after heating at 500° ≤10%, (ii) the MPLC purity ≥90%, and (iii) the acid value ≤0.5 mg-KOH/9.

CH2-Ph

THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT RE.CNT 12

AMBMERGISOF 62 CASBUS COPYRIGHT 1007 ACS ON STN 2004:857653 CAPLUS Full-Lext

141:350867

62284-92-8 CAPLUS 2.4,8.10-Tetracxa-3,9-diphosphaspiro[5.5]undecane, J,9-bis(2-phenylethyl)-, J,9-dioxide (9CI) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8.10-Tetroxas-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWERGANOF 62 CAPLUS COPYRIGHT 2007 ACSON STN

2005:547658 CAPDUS FULL-text
143:79071
Flame-retardant styrene resin compositions and molded article obtained therefrom
Yamanaka, Katsuhiro, Imamura, Koichi, Tanabe, Seiichi, Taketani, Yutaka
Crejinnofedicalustidanauanan
PCT Int. Appl., 53 pp.
CODEN, PIXXD2
Patent
Jananese

DT

LA Japanese FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE PATENT NO. KIND DATE APPLICATION NO. DATE

NO 2005056571 A1 20050623 NO 2003-JP15799 1051210

H: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BM, BY, BZ, CA, CH,

CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,

4 of 76

Results 10/541021

Halogen-free flame-retardant styrene resin composition Endo, Shigeru

REAJABAN-COFPOYACTION JAPAN
POT INT APPL. 69 pp.
CODEN; PIXXD2
JAPAN-BE

FAN.		1	•															
		TENT	NO.			KIN	D	DATE			APPL	ICAT	ION	NO.		D.	ATE	
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PI	WO	2004	0878	9		A1		2004	1014		WO 2	004 -	J P4 3	37		atz	DAD:	328
		W:	AE,	AG,	AL,	AM,	AT,	ΑU,	AZ,	BA,	88,	BG,	BR,	BW,	BY,	ВŹ,	CA,	CH,
			CN,	co,	CR,	CU,	CZ,	DE,	DK,	DM,	DZ,	EC,	EE,	EG,	ES,	FI,	GB,	GD,
			GE,	GH,	GM,	HR,	HU,	ID,	IL,	IN,	IS,	JP.	KE,	KG,	KP,	KR,	KZ,	LC,
			LK,	LR,	LS,	LT,	LU,	LV,	MA,	MD.	MG,	MK,	MN.	MW,	MX,	MZ,	NA,	NI,
			NO,	NZ,	OM,	PG,	PH,	PL,	PT,	RO,	RU,	SC,	SD,	SE,	SG,	SK,	SL,	SY,
			ΤJ,	TM,	TN,	TR,	TT,	TZ,	UA,	UG,	US,	UZ,	VC,	VN,	YU,	ZA,	ZM,	ZW
		RW:	BW,	GH,	GM,	KE,	LS,	MW,	MZ,	SD,	SĻ,	SZ,	TZ,	UG,	ZM,	ZW,	AM,	AZ,
			BY,	KG,	KZ,	MD,	RU,	TJ,	TM,	AT,	BE,	BG,	CH,	CY,	CZ,	DE,	DK,	EE,
			ES,	FI,	FR,	GB,	GR,	HU,	IE,	IT,	LU,	MC,	NL,	PL,	PΤ,	RO,	SE,	SI,
			SK,	TR,	BF,	BJ,	CF,	œ,	CI,	CM,	GA,	GN,	GQ,	G₩,	ML,	MR,	NE,	SN,
			TD,	TG														
	CN	1768	110			Α		2006	0503		CN 2	004 -	8000	8516		2	0040	326
	US	2006	2588	16		A1		2006	1116		₩3 72	0055	5509	45		2	0050	928
PRAI	JP	2003	-908	59		A		2003	0328									
	JР	2003	-356	211		A		2003	1016									
	.TP	2003	-357	104				2003	1017									

JP 2003-357404 A 20031017
W 2004-079437 W 20040326
MARPAT 141:350867
Title filame-retardant styrene resin composition comprises (A) 100 parts of a styrene resin having weight retention at 500° of 520% and (B) 0.5-50 parts of halogen-free (quasi) sphere-shaped filame-retardant particles, wherein the component (B) with mol. weight of 200-2,000 and area-average diameter of 0.01component (8) with mol. weight of 200-2,000 and area-average diameter of 0.01-3 µm have been dispersed in (A), and have weight retention at 500° of 2204 and m.p. of 100°- 400°. Thus, a composition was formulated from low-cis polybutadiene rubber-modified α.Me styrene dimer-styrene copolymer 100 and dibenzyl pentaerythritol diphosphonate 2 parts, to give a sample showing UL-94 flame resistance V-2.
20544-37-0 62294-92.
RL: MOA (Modifier or additive use); USES (USES) (halogen-free flame-retardant styrene resin composition)
20544-37-0 CAPLUS
2(4,4,6).Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

62284-92-6 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT RE.CNT

ANSWER OF 68 GARLOS COPYRECUT 2007 AGS ON SUN

141;124589

141:124589
Pire-resistant resin compositions and molded products therefrom Yamanaka, Katsuhiro, Taketani, Yutaka

Rengising Chemical Walder Dagana
Jpn. Kokai Tokkyo Koho, 38 pp.

CODEN: JKXXAF

DТ Patent

DT Patent LA Japanese FAN.CNT 1 PATENT NO.

APPLICATION NO. KIND ----DATE DATE P1 JP 2004210968 PRAI JP 2003-176 OS MARPAT 141:124589 20040729 JP 2003-176 **120030300**

MARPAT 141:124589

The comprise comprise (A) 100 parts resin components containing 260% aromatic polyesters, (B) 1-100 parts 3-X1-9-X2-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide [X1, X2 = (AL) (Ar]n; AL = C1-5 branched or linear alighatic hydrocarbon; Ar = (un)substituted Ph, naphthyl, anthryl; n = 1-3], (C) 0.1-100 parts compds, containing 22 OH, (D) 0-50 parts [ireproofing resins, and (B) 0-200 parts filters. Thus, PBT (TRB-H) 100, 3,9-dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (preparation described) 20, and pentaerythritol 3 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 94 fire resistance rating V-0 and oxygen index 29.0%.
2504.4-37-07, 3,9-01benzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 62024-97-99, 3,9-8163(2-phenyl-chyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 475101 4-37-0, 3,9-81640-methyl-benzyl)-2,4,8,10-

62284-92-8 CAPLUS

7 of 76

Its IU/541021

7 of 76

branched or linear aliphatic hydrocarbon, Ar = (un)substituted Ph, naphthyl, anthryl, n = 1-3], (C) 0.1-100 parts compds, containing N, (D) 0.1-100 parts alkali metal salts and/or alkaline earth metal salts, (E) 0-50 parts (Ireproofing resins, and (F) 0-200 parts (Illers, Thus, PBT (TRB-H) 100, 3,9-dibenzyl-2.4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (preparation described) 20, melamins cyanurate (MC 510) 5, and CaCOJ 3 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 94 fire resistance rating V-0 and good hydrolysis resistance. 20544 37-06, 3,9-bibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide %2784-32-8F, 3,9-Bis (2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,9-Bis (diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,3-9-Bis (diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,3-9-Bis (diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 3,3-9-Bis (diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-9P 4,8,10-tetraoxa-3,9-dip

62284-92-8 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

_ CH2-- CH2-- Ph

475101-74-7 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-

Results 10/541021

6 of 76

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9Cl) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8.10-Tetroxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS
2.4.8.10-Tetraoxa-3,9-diphosphäspiro(5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

N 2004;549757 CAPLUS Full-text
DN 141:89947
TI Halogen-free, tire-resistant resin compositions and molded products

therefrom
Yamanaka, Katsuhiro, Taketani, Yutaka
Telinechemicalia Editurapaa
Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN. JKXXAF
Patent

DT

Japanese

PATENT NO.

KIND DATE APPLICATION NO. DATE

PI JP 2004189822 A 20040708 JP 2002-357816 20021210
PRAI JP 2002-357816 700343210

S MARPAT 141:89947

AB The compns. comprise (A) 100 parts resin components containing 260% aromatic polyesters, (B) 1-100 parts a 7-X1-27-24, 8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecame 3,9-dioxide [X1, X2 = (AL) (Ar)n; AL = C1-5

Results 10/541021 8 of 76 , 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWER 6 OP 62 CABLUS COLVECTHE 2007 AGS on SEN. 2004:351704 CAPRUS FURTHERING TO AGS ON SEN. THE Hologen-free, fire-resistant

DT Patent

LA Japanese FAN.CNT 1

NT 1 PATENT NO. KIND DATE APPLICATION NO. DATE 20040430 PI JP 2004131580 PRAI JP 2002-297127 A JP 2002-297127 20021010 20021010 MARPAT 140:358244

I P 2002-297127

ARAPRAT 140:158244
The compns. comprise (A) 100 parts resin components containing 260% aromatic polyeaters, (B) 1-100 parts 3,9-dloxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane 3,9-diaralkyl derivs., (C) 0.1-100 parts N-containing compds., (D) 0-50 parts fireproofing resins, and (E) 0-200 parts fillers. Thus, PBT (TRB-H) 100, 3,9-dibxled (preparation described) 20, and melamine cyanurate (MC 610) 5 parts were blended, pelletized, dried, and injection molded to give a test piece showing UL 94 fire resistance rating V-0 and 0 index 29.3%.

10541 37 39, 3,9-Dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane 3,9-dioxide 62284-82-59, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane 3,9-dioxide 62284-82-59, diphosphaspiro[5.5] undecane 3,9-dioxide 62284-82-69, diphosphaspiro[5.5] undecane 3,9-dioxide 62284-82-59, diphosphaspiro[5.5] undecane 3,9-dioxide 62284-82-69, diphosphaspiro[5.5] undecane 3,9-d

20544-37-0 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

CH2-Ph

62284-92-6 CAPLUS 2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8.10-Tetraoxa-3,9-diphosphaspiro (5.5) undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS 2.4.8, 10-Tertanax-3.9-diphosphaspiro(5.5)undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

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DT

DT Patent LA Japanese FAN.CNT 1

PATENT NO. JP 2004115763

KIND DATE

20040415 C20020930

APPLICATION NO.

JP 2002-285207

20020930

DATE

PRAI JP 2002-285207 OS MARPAT 140:322337 GI

Results 10/541021

11 of 76

475101-76-9 CAPLUS

4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9CI) (CA INDEX NAME)

ANAMER B. O. 64 CAPIUS CONTIGHT 2007 ACS, on STN3
ANA 2004:271545 CAPIUS FULL TEXT
AND 140:103858
TI Photochemical preparation of high-purity spiro-pentaerythritol
bis(phosphonate)s

TI Photochemical preparation of high-purity spiro-pentaerythritol bistyphosphonate)s

IN Yanagida, Takatsune, Imamura, Koichi, Tanabe, Seiichi, Taketani, Yutaka Parajani, Chamiralis-Lida, Japana

So Jph. Kokai Tokkyo Koho, 28 pp. COORN, JKXXAP

DT Patent

Japanese
FAN. CNT 1

PATENT NO. KIND PI JP 2004099565 PRAI JP 2002-266622 OS MARPAT 140:303858

DATE 20040402 (20020912

APPLICATION NO. JP 2002-266622

DATE

Ar2-22-0-1

Title compds. I (Ar4, Ar5 = C6-20 (un)substituted aryl, Z4, Z5 = CR13R14, CR15R16CR17R18, R13, R14 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl, R15-R18 = similar group as in R13, R14], useful as halogen-free fireproofing agents, etc., are prepared by chlorination of pentaerythritol with PC13 in the presence of inert solvents, successive treatment with Ar12IOR

The compns. comprise 100:(1-100) (part) (A) polyamides and (B) I [X1, X2 = RArn; R = (branched) C1-5 aliphatic hydrocarbyl(ene); Ar = (aubstituted) Ph, naphthyl, or anthryl substituted on any C in R, n = 1-3). Moldings from the compns. are useful for automotive elec. parts. etc. Thus, a 100:15 mixture of Durethan A 30 (nylon 66) and 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dibenzyl-3,9-dioxide (prepared from pentaerythritol, PC13, and Babr) was injection molded to give a specimen showing U, 94 fire resistance rating V-0.
20544-37-0P 62284-32-8F 475101-74-7P
475101-76-9P, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-bis(diphenylmethyl)-3,9-dioxide
RL: TMF (industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); FREP (Preparation); USES

(Technical or engineered material use), FREF (Preparations, uses)
(Uses)
(fireproofing agents, halogen-free fire-resistant polyamide compns.
containing spiro bisaralkylphosphonate fireproofing agents useful for
automobile elec. parts)
2544-37-0 CAPLUS
2544-37-0 CAPLUS
3,9-dioxide (CA INDEX NAME)

62284-92-8 CAPLUS 2,4.8,10-Tetraox-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-74-7 CAPLUS 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

Results 10/541021

12 of 76

[Ar] = C6-20 (un) substituted aryl; 21 = similar group as in 24, 25], followed by UV irradiation of the resulting pentaerythritol bis(phosphite)s II (Ar2, Ar3 = similar group as in Ar1; 22, 23 = similar group as in 21). Thus, Pentarit S (pentaerythritol) was chlorinated with PC13, condensed with PDCH20H, and UV irradiated to give 80.1% I (Ar424 = Ar525 = PDCH2) with 99.1% purity.

20544-37-0P
RL: IMP (Industrial manufacture), SPN (Synthetic preparation), FREP
(Preparation)
(one-pot preparation of high-purity spiro-pentaerythritol bis(phosphonate)s
via bis(phosphite)s)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmothyl)-,
3,9-dioxide (CA INDEX NAME)

TI Preparation of spiro-pentaerythritol diphosphonates using recycled solvents
IN Tanabe, Selichi, Ando, Shinichi, Imamura, Koichi, Tando, Kazushi, Yanagida, Takatsune, Takatani, Yutaka
PA Coping Chemicals Let Transpant
Solyn, Kokai Tokkyo Koho, 28 pp.
CODEN: JKXXAF
P Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

PI JP 2004099566 PRAI JP 2002-266623

20040402 JP 2002-266623

DATE 20020912

Its 10/541021

Title compds. I [Ar4, Ar5 = C6-20 (un) substituted aryl; Z4, Z5 = CR14R15, CR16R17CR16R19; R14, R15 = N, C6-20 (un) substituted aryl, C1-20 (un) saturated hydrocarbyl; R16-R19 = similar group as in R14, R15], useful for fireproofing agents, etc., are prepared by chlorination of pentaerythricol (II) with PCI3 in the presence of inert solvents, successive treatment with Ar1210H [Ar1 = C6-20 (un) substituted aryl, Z1 = similar group as in Z4, Z5] in the presence of organic bases, removal of the bases, their salts, and the solvents, and treatment of the resulting spiro-pentaerythricol diphosphices III (Ar2, Ar3 = similar group as in Ar1; Z2, Z3 = similar group as in Z1) with R13X (R13 = alkali metal, C1-20 alkyl, aralkyl, aryl, etc., X = Br, iodine) at 80-300°. The removed solvents are recovered and reused in the above process. Thus, II was chlorinated with PCI3 in pyridine and xylene, condensed with PhCR20H, filtered, the filtrate washed with 1N NaOM, the organic phase evaporated, and refluxed with PhCR2Br to give 89% I (Ar424 = Ar5Z5 = PhCR2) with 99% purity. II was similarly reacted in recovered solvent to give the product without decline in yield or purity.

20544 37 %P, 39-Bis(phenylmethyl)-3.9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5) jundecane

RL: IMF (Industrial manufacture), fREP (Preparation) [Phenylmethyl)-1, 29544-77-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5) undecane, 3,9-bis(phenylmethyl)-1, 2-dioxid (CA) NDRX MAME)

2054-37-0 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

AN 20041266649 CAPRUS COPYRIGHT 2007 AGS ON STAN

140:304654

DN TI Preparation of spiro-pentaerythritol diphosphonates using recovered

halides
Inamura, Koichi, Ando, Shinichi, Tanabe, Seiichi, Tando, Kazushi,
Yanagida, Takataune; Taketani, Yutaka
Tekdun Chemicale Ledos Ospan,
ph. Kokai Tokkyo Koho, 20 pp.
CODEN: JKXXAP
Patent
Japanese
.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE IN

JP 2004099550

JP 2002-265180 MARPAT 140:304654

20040402 200209311

JP 2002-265180

DATE

20020911

Ar1-21-0-P'0-0'P-0-22-Ar2

Results 10/541021

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The compds. I (Ar1, Ar2 = C6-20 (un)substituted aryl, 21, 22 = CRIR2, CRIR4CRSR6, R1, R2 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R3-R6 = H, C6-20 (un)substituted aryl, C7-30 (un)substituted aryl, C7-3

20544-37-PP
RE: IMF (Industrial manufacture), MOA (Modifier or additive use); PUR
(Purification or recovery); PRET: Préparation; USES (Uses)
(purification of pentaerythritol spirocyclic diplosphonates as fireproofing

ipurification of pentaery(nritor spirocyclic dipnosphonaces as tireproo agents with washing solvents containing 250% organic solvents having predetd. relative permittivity) 20544-37-0 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

AUSTER 12 OF 62 GABRUS COPYRIGHT 2007 AGS ON STN

- 140:253718

 Preparation of high-purity pentaerythritol spirocyclic diphosphonates without purification of intermediates are an area of the following transbe, Seiichi, Yanagida, Takatsune; Tando, Kazushi, Imamura, Koichi; Ando, Shinichi, Taketani, Yutaka Teijin Chenicals Ltd., Japan

 Jpn. Kokai Tokkyo Koho, 23 pp.
 CODEN: JKXXAF
 Patent
 Japanese
 CNT 1
 PATENT NO, KIND DATE APPLICATION NO. DATE

- DT LA FAN

JP 2004083538 20040318 JP 2002-263848

20020910

140:253717
Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s without purification of intermediates
Tanabe, Seitchi; Yanagida, Takatsune; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Taketani, Yutoka
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 24 pp.

Title compds, I [Ar3, Ar4 - C6-20 (un)substituted aryl; Z3, Z4 - CR7R8, CR9RIOCRIIR12, R7, R8 - H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R9-R12 - similar group as in R7, R8], useful for fireproofing agents, etc., are prepared by treatment of spiro-pentaerythricol diphosphites II (Ar1, Ar2 - similar group as in Ar3, Ar4, Z1, Z2 - similar group as in Z3, Z4) with R13x (R13 - C1-10 alkyl, aralkyl, aryl, alkali metal, etc; X - Br. iodine) at 80-300°, wherein the halides are recovered and reused in the reaction. Thus, II (Ar1Z1 - Ar2Z2 - PhCHZ) was refluxed with PhCHZBr in xylene for 4 h to give 91% I (Ar3Z3 - Ar4Z4 - PhCHZ) with >99% purity. PhCHZBr was recovered and reused in the rearrangement to give the product without decline in yield or purity. [1944-12" N. 3,9-Bistphenylmethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undocane
RL: [MF (Industrial manufacture); PREP (Fryncia,106)

Results 10/541021

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

ANSWER IN OF 62 CAPLUS GOPYRIGHT 2000 AGS ON STN 2004; 268542 CAPLUS Full-text

Full-text 140:288188

TI TI Purification of pentaerythritol spirocyclic diphosphonates as fireproof agents for polymers and property of the proof o Purification of pentaerythritol spirocyclic diphosphonates as fireproofing

DATE PI JP 2004099526 PRAI JP 2002-263849 OS MARPAT 140:288188 GI 20040402 JP 2002-263849 20020910

Results 10/541021 PRAI JP 2002-194712 A 230000000000000 CASREACT 140:253718; MARPAT 140:253718

The diphosphonates I (Arl. Ar2 = CS-20 aryl, R1-R8 = H, CS-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCI3 in nonreactive solvents, treatment of the reaction mixts. with ArcRiR2Cr3/R4ON (Ar = CS-20 aryl, R1-R4 = same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Arl, Ar2, R1-R8 = same as above), and heating the reaction mixts in the presence of RX (R = alkali metal, C1-20 alkyl, aralkyl, etc; X = Br, iodide) at 80-300°. Thus, II was treated with PCI3 in o-dichlorobenene, treated with PCHCHCHOOK in the presence of pyridine, filtered, and the (Iltrate was washed with aqueous NaOH solution and heated in the presence of PCHCHCHABr at 130° to give 90-31 i (R1-R8 = H, Ar1 = Ar2 = Ph) with purity 99-34.
42246-12-84, 3,9-81s(2-phenylethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphappirol5-slundecame
RE: IMF (Industrial manufacture); SPN (Synthetic preparation); FPFF irrogarations:

(preparation of high-purity pentaerythritol spirocyclic diphosphonates as polymer fireproofing agents without purification of intermediates) 62284-92-8 CAPLUS

64284-92-8 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9CI) (CA INDEX NAME)

2004:217190 CAPLUS Full-text DN TI

Results 10/541021 17 of 76

CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO.

APPLICATION NO. DATE PI JP 2004083537 A 20040318 PRAI JP 2002-194711 A 10020033 OS CASREACT 140:253717, MARPAT 140:253717

$$Ar1 - \frac{1}{2} - \frac{1}{2}$$

- The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts with ArCRIRZOH (Ar = C5-20 aryl, R1, R2 = same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Ar1, Ar2, R1-R4 = same as above), and heating the reaction mixts in the presence of RX (R = alkali metal, C1-20 alkyl, aralkyl, etc, X = Br, iodide) at 80-300*. Thus, II was sequentially treated with PCl3 in xylene and with PhORHOM in the presence of pyridine, filtered, and the filtrate was washed with aqueous NAOH solution and then heated in the presence of PhORH2E at 130* to give 90.6% I (R1-R4 = H, Ar1 = Ar2 = Ph) with purity 99.1%.

 7555-1-77-0F, 3,9-Bis(phenylmethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5) undecane
 RL: IMP (Industrial manufacture), SPN (Synthetic preparation), FREP (Freparation)
- - (Preparation)

(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

polymer fireproofing agents without purification of intermediates) 20544-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

R/su	ilts 10/541021		19 of 76		
Chean.	MANAGE ILE DY 58 P.C.	APLUS-	CORYRIGHT 20	07_ACS_on_STN	
AN	2004:139335 CAPLU	s Full	text	- September - Control	
DN	140:182447				
TI	Halogen-free fire-	resista	nt aromatic	polyester-based resin c	omposition
	and their moldings				
IN	Yamanaka, Katsuhir	o: Take	tani. Yutaka		
PA	Teljin Chemicals L	td. Jai	pan		
SO	Jpn. Kokai Tokkyo				
	CODEN: JKXXAF				
рт					
DT LA	Patent				
LA	Patent Japanese				
LA	Patent Japanese CNT 1	KIND	DATE	ADDITION NO	DATE
LA	Patent Japanese	KIND	DATE	APPLICATION NO.	DATE
LA FAN.	Patent Japanose CNT 1 PATENT NO.				
LA FAN.	Patent Japanese CNT 1 PATENT NO. JP 2004051916	KIND	20040219	APPLICATION NO. JP 2002-214950	DATE 20020724
LA FAN.	Patent Japanose CNT 1 PATENT NO.				

- Title compns., also having good hydrolysis resistance, comprise 100 parts resins containing 260% aromatic polyesters, 1-100 parts organic phosphates I [R1, R4 = H, C1-5 aliphatic hydrocarby]; R3, R6 = C1-5 aliphatic hydrocarby]; R2, R5 = (substituted) Ph, (substituted) anhthy], o.1-100 parts alkali and/or alkaline earth metal salts, 0-50 parts (freproof improver resins, and 0-200 parts fillers. A composition containing TRB-H 100, 2.4.8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane 3,9-di-α- methylbenzyl-3,9-dioxide (prepared from pentaerythritol, PC13, and 1-phenylethyl bromide) 15, and CaCO3 5 parts was extruded and molded into a test piece showing ULS4 test (for 1.6-mm thickness) V-0 and flexural strength retention ≥70% after 24 h under 120° and 100% relative humidity.
 475101-74-79
 RL: TMP (Industrial manufacture); MOA (Modifier or additive use);
 PREP (Freparation; USES (USes)
 (diphosphaspiro compound- and alkali (or alkaline earth) salt-containing atic

matic

polyester-based compns. with fire and hydrolysis resistance)
475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro [5.5] undecane, 3,9-bis (1-phenylethy1)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 18 of 76

TI

Als IO/S41021 18 of 76
Halogen-free fire-resistant aromatic polyester-based resin compositions and their moldings
Yamanaka, Katsuhiro, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 37 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE KIND PI JP 2004051917 PRAI JP 2002-214951 OS MARPAT 140:182448

JP 2002-214951 20020724

Title compns., also having good hydrolysis resistance, comprise 100 parts Title compns., also having good hydrolysis resistence, comprise 100 parts resins containing 260% aromatic polyesters, 1-100 parts organic phosphates I [R1, R4 - H, C1-5 aliphatic hydrocarbyl, (substituted) Ph. (substituted) naphthyl, (substituted) anthryl, R2, R3, R5, R6 - (substituted) Ph. (substituted) naphthyl, (substituted) anthryl), 0.1-100 parts alkali and/or alkaline earth metal salts, 0-50 parts fireproof improver resins, and 0-200 parts fillers. A composition containing TRB-H 100, 2.4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane 3,9-bis(diphenylmethyl)-3,9-dioxide (prepared from diphenylmethyl)phosphonic dichloride and pentaerythritol) 15, and CaCO35 parts was extruded and molded into a test piece showing UL94 test (for 1.6-mm hydrogas), 200 and (farts 24 hydrog 100 and was extruced and moided into a test piece snowing objected (for 1.6-mm thickness) V-0 and flexural strength retention 270% after 24 h under 120° and 100% relative humidity.
475101-76-99, 2.4.8.10-Tetraoxa-3,9-diphosphaspiro(5,5)undecane
3,9-bia(diphenylmethyl)-3,9-dioxide
RL: IMF (Industrial manufacture), MOA (Modifier or additive use),
PREF (Preparation), USES (Uses)
(diphosphaspiro compound- and alkali (or alkaline earth) salt-containing acic

aromatic

polyester-based compns. with fire and hydrolysis resistance) 475101-76-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 20 of 76

ANSWER 18 OF 62 CAPLUS COPYRIGHT 2000 MAGS YOU STN

2004:139266 CAPLUS Full-text

140:182441 Halogen-free fire-resistant polymer compositions and their moldings with

Malogen-free tire-resistant polymer of good hydrolysis resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 37 pp. CODEN: JKXXAF

DT Patent LA Japanese FAN.CNT 1 PATENT NO. DT LA

KIND DATE APPLICATION NO. DATE PI JP 2004051819 PRAI JP 2002-212260 OS MARPAT 140:182441 GI 0040219 JP 2002-212260 20020722

The compns. comprise (a) 100 parts polymors containing 260% aromatic polyesters, (b) 1-100 parts organic P compds. I (Ar1, Ar2 = (substituted) Ph. naphthyl, anthryl; R1-R4 = H. C1-5 aliphatic hydrocarbon group, (substituted) Ph. naphthyl, anthryl; All, Alz = C1-5 aliphatic hydrocarbon group, Ar3, Ar4 = (substituted) Ph. naphthyl, anthryl; All, Alz = C1-5 aliphatic hydrocarbon group, Ar3, Ar4 = (substituted) Ph. naphthyl, anthryl; p. q = 0-3], (c) 0.1-100 parts alkali metal salts and/or alkaline earth metal salts, (d) 0-50 parts fire resistance-improving polymers, (e) 0-200 parts fillers, and optionally (f) 0.01-10 parts fluoropolymers. Thus, a composition containing TRB H (polybutylene terepithalate) 100, 3, 9-bis(2-phenylethyl)-2,4,8,0-tetraoxa-3,9-diphosphaspir(5.5)undecane-3,9-dioxide 15, and CaCO 5 parts was injection-molded to give a test piece showing UL-94 rating V-0 (thickness 1.6 mm). 52284-92-97, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane-3,9-dioxide
RL; IMF (Industrial manufacture); MOA (Modifier or additive use), TEM (Technical or engineered material use), FREP (Préparation); USES (Uses)

(Tieproofing agent; preparation of P-containing fireproofing agents for atic

atic polyester moldings with good hydrolysis resistance)
62284-92-8 CAPUUS
2,4,8,10-Tetracoxa-1,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phonylethyl), 3,9-dioxide (9CI) (CA INDEX NAME)

AARSHER 17 OR 62 CAPLUS CONVEIGHT 2007 ACS on FTV 2 2000 Mo32 60 CAPLUS CONVEIGHT 2007 ACS on FTV 2 2000 Mo32 60 CAPLUS CONVEIGHT 2007 ACS on FTV 2 2000 Model of the Conveight Conveight

Jpn. Kokai Tokkyo Koho, 36 pp. CODEN: JKXXAF

Patent

Japanese

PATENT NO. JP 2004051818 PRAI JP 2002-212259
OS MARPAT 140:182440

KIND DATE 0040219

APPLICATION NO. DATE JP 2002-212259 20020722

O 0 CH2 - R2

The compns. comprise (a) 100 parts polymers containing 260% aromatic polyesters, (b) 1-100 parts organic P compds. I [R1, R2 = (substituted) Ph, naphthyl, anthryl], (c) 0.1-100 parts alkali metal salts and/or alkaline eametal salts, (d) 0-50 parts fire resistance:improving polymers, (e) 0-200 parts fillers, and optionally (f) 0.01-10 parts fluoropolymers. Thus, a composition containing TRB H (polybutylene terephthalate) 100, 3,9-dibensyl 2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane-3,9-dioxide 15, and CaCOJ parts was injection-molded to give a test piece showing UL-94 rating V-0 (thickness 1.6 mm).

thickness 1.6 mm).

20544-27-0P, 3,9-Dibenzyl-2,4,8,10-tetraoxa-3,9diphosphaspiro[5,5]underane 3,9-dioxide

RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM
(Technical or engineered material use); PREF (Freparation); USES

(fireproofing agent; preparation of P-containing fireproofing agents for aromatic

polyester moldings with good hydrolysis resistance)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

Results 10/541021

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62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9Cl) (CA INDEX NAME)

CH2- CH2- Ph Рh— СН2 — СН2

AN 2004/117724 CAPLUS F011-text

140:181621
Preparation of colorless and high-purity pentaerythritol spirocyclic bis(phosphonate)s
Ando, Shinichi, Yamanaka, Katsuhiro; Tanabe, Seiichi; Taketani, Yutaka Teijin Chenicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JXXXAF
Patent
Japanese
CNT 1
PATENT NO, KIND DATE APPLICATION NO, DATE

APPLICATION NO.
JP 2002-195718

The title bis(phosphonate)s I (Ar2, Ar3 = C6-20 aryl, R3-R6 = H, C6-20 aryl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by condensation of pentaerythritol (II) with AriCRIRAPION22 (Arl = C6-20 aryl, R1, R2 = H, C6-20 aryl, C1-20 hydrocarbyl; X = C1, Br, lodide) in the presence of organic bases in organic solvents, dissoln. of byproduct H halide-organic base salts in H2O, removal of the aqueous soins, dispersing of the reaction products in aliphatic monohydric alcs., and filtration of the dispersions. Thus, II was condensed with PhCH2P(O1C2) in the presence of pyridine in CHC13, water was added, the water phase was removed, the CHC13 phase was vacuum-concentrated, MeOH was added, and the slurry was filtered to give I (Ar2 = Ar3 = Ph, R3-R6 = H) in 99t purity and with a yellowing index 2.87.

2544-13-70-P, 3,9-81s(phenylmethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dioxio-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane

AN 2004:117725 CAPLUS FULL LEXT DN 140:181622

Preparation of colorless and high-purity pentaerythritol spirocyclic

Dis(phosphonate)s and high-purity pentaety. Third sprince of the high sprince of the h

so

DT Patent LA Japanese FAN, CNT 1 PATENT NO. DT LA

KIND DATE APPLICATION NO. DATE P1 JP 2004043312 A 1040212 PRAI JP 2002-195719 2002DBDAED OS CASREACT 140:181622, MARPAT 140:181622 JP 2002-195719 20020704

The title bis(phosphonate)s I (Ar2, Ar3 = C6-20 aryl; R5-R12 = H, C6-20 aryl; C7-30 aralkyl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by condensation of penteerythritol (II) with AriCRIRZCTIRAP(O)X2 (Ar1 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl; X = C1, Br, iodide) in the presence of organic bases in organic solvents, dissoln, of byproduct H halide-organic base salts in H2O, removal of the aqueous solns., dispersing of the reaction products in aliphatic monohydric alcs., and filtration of the dispersions. Thus, II was substituted with PhCH2CH2P(O)Cl2 in the presence of pyridine in CHCl3, water was added, hte water phase was removed, the CHCl3 phase was vacuum-concentrated, MeOH was added, and the slurry was filtered to give I (Ar2 = Ar3 = Ph, R5-R12 = H) in 99% purity and having a yellowing index 1.54.
63284-37.6F, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dioxide
RI. IMF (Industrial manufacture) SPN (Synthetic preparation); PREP

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(preparation) of pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins by condensation of pentaerythritol with phosphonyl dihalides)

Results 10/541021

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RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREF

RE: IMF (Industrial manufacture); SPN (synthetic preparation); PREP (frogazation); (preparation of pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins by condensation of pentaerythritol with phosphonyl dihalides)
20544-37-0 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-76-9 CAPLUS 2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(diphenylmethyl) 3.39-dioxide (9C1) (CA INDEX NAME)

ORYRIGHT_2007LAGS_ORYRIGHT_2007LAGS_OR/STN

140:147311

TI Penteerythricol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance in Yamanaka, Katsuhiro, Taketani, Yutaka

PA Teijin Chemicals Ltd., Japan

SJpn. Kokai Tokkyo Koho, 21 pp.
CODEN: JKXXAF

DP Patent

LA Japanese
FAN.CHT 1
PATTENT UT

PATENT NO.

APPLICATION NO. DATE 10040205 DATE JP 2004035797 JP 2002-196779 MARPAT 140:147311 JP 2002-196779 20020705

$$R^{1} = \begin{bmatrix} R^{2} & & & & & \\ \frac{1}{6} & & & & & \\ & & & & & \\ \end{bmatrix}$$

The tireproofing agents are I (R1, R4 - H, C1-5 aliphatic hydrocarbyl, Ph, naphthyl, anthryl; R2-R6 - Ph, naphthyl, anthryl). The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts J. Thus, an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 - R4 - H, R2-R6 - Ph) showed fire resistance (UL 94 test) V-0 and deflection temperature under load 177- 47-10-49, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PREF (Fitparationi; USES (Uses) (manufacture of pentaerythritol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings) 47510-1-6-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSHER ON ON 162 CAPPUS COPYRIGHT 2009 RCS OF STAND 2004:97705 CAPPUS Full-text

DN TI 140:147310
Pentaerythritol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho. 22 pp. CODEN: JKKKAF

PA SO

Patent Japanese

PATENT NO. KIND DATE APPLICATION NO. DATE 20040205 0020705 JP 2004035796 JP 2002-196778 20020705 PRAI JP 2002-196778 OS MARPAT 140:147310

Results 10/541021

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The fireproofing agents are I (R1, R2 = Ph, naphthyl, anthryl) and have acid value of S0.7 mgKOH/g. The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus. an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 = R2 = Ph) 5 parts showed fire resistance (VL 94 test) V-0 and deflection temperature under load

20544-27-6P

20544-27-CP
RE. IMF (Industrial manufacture), MOA (Modifier or additive use),
PREP (Preparation), USES (Uses)
(manufacture of pentaerythrical spirocyclic diphosphonate fireproofing
agents with no adverse effect on heat resistance of polyphenylene ether
compns. and moldings)
20544-37-O CAPLUS
2.4.8.10-76trexoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3.9-dioxide (CA INDEX NAME)

ANSTER AND LEVEL OF CO. OF PRINCE COPYRIGHT PROPERTY OF STREET

2004:97543 CAPLUS Full-text 140:164019

140:154019
Preparation of pentaerythritol spirocyclic bis(phosphonate)s without drying of the bis(hydrophosphonate) intermediate and isolation of the alkali salt intermediates
Ando, Shinichi; Tamamura, Koichi; Tanabe, Seiichi; Taketani, Yutaka Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

KIND ----APPLICATION NO.
JP 2002-195717 PATENT NO. KIND DATE

JP 2004035481 A 200205
JP 2002-195717 CASREACT 140:164019; MARPAT 140:164019

The title bis(phosphonate)s I (Y = CR8R9CR6R7AT2; Z = CR10R11CR12R13AT3; AT2, AT3 = C6-20 aryl; R6-R13 = H, C6-20 aryl; C7-30 aralkyl; C1-20 hydrocarbyl), useful as fireproofing agents for resins, are prepared by treatment of pentaerythritol with PCl3 under an inert atmospheric, oxidation of the

Results 10/541021

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The fireproofing agents are I (Ar1-Ar4 = Ph, naphthyl, anthryl, R1-R4 = H, C1-5 aliphatic hydrocarbyl, Ph, naphthyl, anthryl, AL1, AL2 = C1-5 aliphatic hydrocarbyl, Ar3 and Ar4 may bond to C atom of AL1 and AL2, resp., p, q = 0-3) hydrocarbyl, Ar3 and Ar4 may bond to C atom of Al1 and Al2, resp., p. q = 0-3) and have acid value of 50.7 mgKnH/g. The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus, an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1-R4 = N. Ar1 = Ar2 = Ph. Al1 = Al2 = CH2, p = q = 0) 5 parts showed (fire resistance (UL 94 test) V-0 and deflection temperature under load 175: 62281-32-3P

REL IMF (Industrial manufacture); MOA (Modifier or additive use);
PREF (Preparation); USES (Uses) (manufacture of pentaerythricol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings) 62284-32-8 CAPLUS

2.4,8.10-Tetracaxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-

22,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSWER 22-05 62 CAPLUS COBURTGHT 2007 ACSTON STW

140:147309

140:147309
Pentaerythritol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 21 pp.
CODEN: JKXXAF TI

DT Patent LA Japanese FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE PI JP 2004035794 PRAI JP 2002-196776 OS MARPAT 140:147309 GI 040205 20020705 JP 2002-196776 20020705

28 of 76

Its tU/541021 28 of 76
resulting bis(chlorophosphite) II with proton sources, filtration of the resulting bis(chlorophosphonate) I (Y, Z = H) under an inert atmospheric, treatment of the solvent-wetted bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl; M = alkali metal) in organic solvents under an inert atmospheric, and substitution of the resulting alkali metal salt I (Y, Z = alkali metal) solns. with Arick2R2RCR4SX (Ar1 = C6-20 artyl, R2-R5 = H, C6-20 artyl, C7-30 artikyl, C1-20 hydrocartyl, X = C1, Br, lodide). Thus, II was oxidized with tert-BuOH, filtered under a N atmospheric, treated with NaOMe in DMF under a N atmospheric, and then substituted with Ph(CH2)2Br to give I (Y = Z = (CH2)2Ph) in 99 purity.

6284-V2-R7-P, 3,9-Bis(2-phenylethyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane
RL: IMP (Industrial manufacture), SPN (Synthetic preparation), PREP (PPRAPAIRICH)

(Preparation) (preparation of pentaerythritol spirocyclic bis(phosphonate)s without

of the bis(hydrophosphonate) intermediate and isolation of alkali salt

L11 ANSHER 24-OF 62 CAPLUS COPYRIGHT 2007-ACS-ONISTN

2004:9752 CAPUS FULLEX

DN 140:164018

TI Preparation of pentaerythritol spirocyclic bis(phosphonate)s without drying of the bis(hydrophosphonate) intermediate and isolation of alkali salt intermediates

N Ando, Shinichi, Tando, Kazushi, Tanabe, Seiichi, Taketani, Yutaka

PA Teijin Chemicals Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN, JXXXAF

DT Patent

L Japanese

FAN.CNT 1

PATENT NO

APPLICATION NO. PATENT NO. DATE KIND DATE PI JP 2004035480 PRAI JP 2002-195716 OS MARPAT 140:164018 GI 20040205 JP 2002-195716 20020704

- The title bis(phosphonate)s I (Y = CR4R5Ar2, Z = CR6R7Ar3, Ar2, Ar3 = C6-20 aryl, R4-R7 = H, C6-20 aryl, C1-20 hydrocarbyl), usoful as fireproofing agents for resins, are prepared by treatment of pentaerythritol with PCl3 in inert an atmospheric, oxidation of the resulting bis(hydrophosphonate) I (Y, Z = H) in an inert amospheric, treatment of the undried solvent-containing bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl; M = alkali metal) in organic solventes under an inert atmospheric, and substitution of the resulting bis(hydrophosphonate) with R10M (R1 = C1-20 alkyl; M = alkali metal) in organic solventes under an inert atmospheric, and substitution of the resulting alkali metal salt I (Y, Z = alkali metal) soins, with Ar1CR2R3X (Ar1 = C6-20 aryl; R2, R3 = H, C6-20 aryl, C1-20 hydrocarbyl; X = Cl, Br, iodide). Thus oxidized with tert-Bu0H, filtered under a N atmospheric, then treated with NaOMe in DMF under a N atmospheric, and then substituted with PhCN2Br to give I (Y = Z = CR2PH) in 994 purity.
 20544-37-0P, 3,9-01bensyl-3,9-dioxo-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane
 R1: IMF (Industrial manufacture); SPN (Synthetic preparation); PREF (Esparation) (preparation of pentaerythritol spirocyclic bis(phosphonate)s without ng

of bis(hydrophosphonate) intermediate and isolation of alkali salt

intermediates)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

2004:79/539 CAPLUS Full:text
140:164017
Preparation of high-purity pentaerythritol spirocyclic
bis(hydrophosphonate) from the corresponding bis(chlorophosphite)
Tando, Kazushi; Ando, Shinichi; Imamura, Koichi; Tanabe, Seiichi;
Taketani, Yutaka
Teijin Chemicals Ltd., Japan

Resu	lts 10/541021		31 of 76		
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004035470	A	040205	JP 2002-194718	200207
PRAI	JP 2002-194718		20020703		
OS	MARPAT 140:146984				
G1					

- The diphosphonates I (Y = CCR3R4R1R2Ar1; Z = CR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl; Rl-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as fireproofing agents for resins, are manufactured by substitution of I (Y, Z = alkali metals) with Ar3CR3R10CR1R12X (Ar3 = C6-20 aryl; R9-R12 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl; X = C1, Br, iodidel). Thus, 0.80 mol I (Y = Z = Na) was substituted with 1.60 mol PhCH2CH2Br, filtered, and purified with H2O and MeOH to give I (Y = Z = CH2CH2Ph) with purity 99% and content of creidual volatile substance 400 ppm. Pellets comprising 100 perts Suntac UT 61 (A83) and 15 parts I (Y = Z = CH2CH2Ph) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

KINEAP DE RV
RI, IMP (Industrial manufacture); MOA (Modifier or additive use); PUR
(Purification or recovery); PREP (Preparation; USES (Uses)
(manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as
fireproofing agents for resins from their corresponding alkali metal

62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSMER 27 OF 42 CARLUST CORYRIGHT 2007 ACSTON STN 2004:97536 CAPLUS <u>Full-text</u>

- 140:146993
 Manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
 Ando, Shinichi; Imamura, Koichi; Tando, Kazushi; Tanabe, Seiichi; DN TI
- IN
- Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 19 pp. CODEN: JKXXAF
- Patent
- LA Japanese FAN.CNT 1

Results 10/541021 30 of 76

80 Jpn. Kokai Tokkyo Koho, 9 pp. CODEN: JKXXAF

Patent

LA Japanese FAN.CNT 1 PATENT NO. KIND

APPLICATION NO. DATE 20020703 PI JP 2004035472 PRAI JP 2002-194720 JP 2002-194720 20020703

DATE

CASREACT 140:164017

The title bis(hydrophosphonate) I is prepared by oxidation of II with proton sources from -20° to 80° in solvents having water content of \$ 1000 ppm. The bis(hydrophosphonate) I may be filtered in an inert atmospheric and recovered as a solid wetted with the solvents without subsequent drying. Thus, II was oxidized with tert-BuOH at 5° in CH2Cl2 (H2O content 3 ppm) and filtered in a N atmospheric to give CH2Cl2-wetted I with selectivity 90%, vs. selectivity 82% when CH2Cl2 containing 10.000 ppm H2O was used.

62284-92-95

81. SPN (Synthetic preparation), 9820 (Franchica)

f2284-42-9F
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of high-purity pentaerythritol spirocyclic
bis(hydrophosphonate) by oxidation of the corresponding
bis(chlorophosphite) in water-free solvents)
62284-92-8 CAPLUS
2,4,8,10-Tetracaxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:97537 CAPLUS FULL CEXT DN 140:14684

140:146984
Manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
Ando, Shinichi, Tando, Kazushi, Imamura, Koichi, Tanabe, Seiichi, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN, JKXXAF
Patent

PA SO

DT Patent LA Japanese FAN.CNT 1

The diphosphonates I (Y = CR1R2Ar1; Z = CR3R4Ar2; Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are manufactured by substitution of I (Y, Z = alkali metals) with Ar3CRSR6X (Ar3 = C6-20 aryl; R5, R6 = H, C6-20 aryl, C1-20 hydrocarbyl; X = C1, Br, iodide). Thus, 0.80 mol I (Y = Z = Na) was substituted with 1.60 mol PhCM2Br, filtered, and purified with H2O and MeOH to give I (Y = Z = CM2Ph) with purity 99% and content of residual volatile substance 350 ppm. Pellets comprising 100 parts Suntac UT 51 (Ass) and 15 parts I (Y = Z = CM2Ph) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

ZC14.43-73 P 475161 74 7P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PUR (Purification or recovery); PRGF (Intification; USES (Uses) (manufacture of low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins from their corresponding alkali metal salts)

20544-37-0 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS 2.4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

ANSWER 28ADF 62 CAPEUS TCOPYRIGHT 2007 ACS ON STN

CAPLUS Full-text 140-147273

140:147273

Pentaerythritol spirocyclic diphosphonate fireproofing agents, and their polyphenylene ether compositions and moldings with good heat resistance Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 21 pp.

CODEN: JKXXAP

Patent

Japanese
CNT 1 TI

CNT 1 PATENT NO. PI JP 2004035795 PRAI JP 2002-196777

KIND

APPLICATION NO. JP 2002-196777

DATE

MARPAT 140:147273

The fireproofing agents are I (R1, R4 = H, C1-5 aliphatic hydrocarbyl), R2, R5 = Ph, naphthyl, anthryl; R3, R6 = C1-5 aliphatic hydrocarbyl). The compns. contain 100 parts blends of 60-100 parts polyphenylene ethers and 0-40 parts styrene polymers, and 1-100 parts I. Thus, an injection molding comprising Zylon (polyphenylene ether) 90, Styron H 9152 (impact-resistant styrene polymer) 10, and I (R1 = R4 = H, R2 = R5 = Ph, R3 = R5 = Mel showed fire resistance (UL 94 test) V-0 and deflection temperature under load 172*.

475101-74-7P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
PREP (Preparation); USES (Uses)
(manufacture of pentaerythricol spirocyclic diphosphonate fireproofing agents with no adverse effect on heat resistance of polyphenylene ether compns. and moldings)
475101-74-7 CAPLUS
2.4.8:10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)



Results 10/541021

35 of 76 compositions containing organophosphorus compounds, and their moldings Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 34 pp. CODEN: JXXXAF

Patent

Japanese

FAN. CNT 1

PATENT NO.

KIND DATE P1 JP 2004018733 PRAI JP 2002-177296

40122

APPLICATION NO. JP 2002-177296

20020618

DATE

MARPAT 140:112503

Title compns. contain 100 parts polymers containing ≥ 60 % ABS and 1-100 parts organophosphorus compds. I [Ar1-Ar4 = (un) substituted Ph. naphthyl. anthryl. R1-R4 = H, C1-5 aliphatic hydrocarbyl. (un) substituted Ph. naphthyl. anthryl. R1. AL2 = C1-5 linear or branched aliphatic hydrocarbyl. p, q = 0-3]. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4.8.10-tetraoxa-3.9-diphosphaspiro[5,5] bundecane-3.9-di(2-phenylethyl)-3.9-dioxide Showed UL-94 flammability rating V-2. heat distortion temperature retention

showed UL-94 (lammability rating V-2, heat distortion temperature retention 964, and no burn marks.

12.9, 42.59
RL: IMF (Industrial manutacture), MOA (Modifier or additive use), PREP (Properties); TBM (Technical or engineered material use), PREP ("Technical or engineered material use), PREP ("Technical or engineered RS resin-based compns, containing tetraoxadiphosphaspiroundecanes)
62264-92-8 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro(5.5)undecane. 3.9-bis(2-phenylethyl)-

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

CH2- CH2- Ph Ph-CH2-CH2

ANSWER 11 OF 62 CARLUS COPYRIGHT 2007 ACS ON STN. 2004:57551 CAPLUS PULL LOX 140:112220

Halogen-free styrene polymer compositions with good flowability and heat and fire resistance, and their moldings

Results 10/541021 34 of 76

2004:57592 CAPLUS Full-text 140:112223

DN TI Flame retardant thermoplastic polycarbonate resin compositions and molded articles

articles
IN Yamanaka, Katsuhiro; Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN: JKXXAF
DT Patent
L Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. PI JP 2004018767
PRAI JP 2002-178370
OS MARPAT 140:112223
GI 20020619 JP 2002-178370

The compns., having good heat resistance and processability, comprise 10 The compnis, having good heat resistance and processability, comprise 100 parts thermoplastic resists containing \$500 polycarbonates and 1-100 parts I [R1, R4 = H, C1-5 aliphatic hydrocarbyl, (un)substituted Ph, naphthyl, anthryl, R2, R3, R5, R6 = (un)substituted Ph, naphthyl, anthryl) having an acid value of \$0.7 mg KOH/g and a purity of \$904. Thus, a test piece prepared from polycarbonate (Panlite L 1225WP) 100, 3,9-bis(diphenylmethyl)-2,4,8,10-tetracoxa-3,9-diphosphaspiro[5,5]undecana 3,9-dioxide [II) (acid value 0.3 mg KOH/g, purity 994) 5, and PTFE (Polyflon MPA-FA 500) 0.2 part showed UL-94 flammability rating V-0, vs. V-1, for a test piece containing II with acid value 1.9 mg KOH/g.
475101-76-99
RI, IMF (Industrial manufacture), MOA (Modifier or additive use),

475101-4-79
RE; INF (Industrial manufacture); MOA (Modifier or additive use);
PREP (Preparation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin

compns.) 475101-76-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphonylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

IN LINSHER 30 OF CO-CAPIUS COPPRION 2000 AGS On STITE ON 2004:57585 CAPLUS PULL PARTY CAPLUS Full-text

140:112503 Halogen-free heat- and fire-resistant transparent ABS resin-based

Results 10/541021

36 of 76

Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 19 pp. CODEN: JKXXAP

\$0

DT

Patent Japanese

PATENT NO. PI JP 2004018626 PRAI JP 2002-173995

DATE 20040122 KIND 20020614

APPLICATION NO. JP 2002-173995 DATE 20020614

DATE

MARPAT 140:112220

The compons. comprise (A) styrene polymors 100. (B) polyphenylene ethers 1-100, and (C) organic P compds. I (R1, R4 = H, C1-5-aliphatic hydrocarbon group; R3, R6 = C1-5-aliphatic hydrocarbon group; R2, R5 = Ph, naphthyl, anthryl) 1-100 parts. Thus, a composition comprising 2,4,8,10-tetraoxa-3,9-diphosphaspir(5). Slundecane. 3,9-bis(a-methylbenzyl)-3,9-dioxide, a high-impact polystyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molded to give a test piece showing limiting 0 index (L01) 25.2*, heat distortion temperature 92°, flowability (MVR) 13.7 cm3/10 min, and UL 94 fire resistance rating V0.
47510:7-7-7-72, 2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide
R1. IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREP 'Preparation'; USES (Uses)

(Uses) (fireproofing agent; pentaerythritol diphosphonate fireproofing agents for styrene polymer compns. with good flowability and heat resistance) 475101-74-7 CAPLUS (2.4.8.10-Tetraoxa-3.9-diphosphaspiro(5.5]undecane, 3.9-bis(1-phenylethyl)-3.9-dioxide (SCI) (CA INDEX NAME)



Results 10/541021 37 of 76 140:112485 Halogen-free heat- and fire-resistant transparent ABS resin-based Compositions containing organophosphorus compounds, and their moldings Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 33 pp. CODEN: JKXXAF DT Patent LA Japanese FAN.CNT 1 PATENT NO. APPLICATION NO. KIND DATE DATE 20020618 JP 2004018734 JP 2002-177297 JP 2002-177297 20020618 MARPAT 140:112485

Title compns. contain 100 parts polymers containing 260% ABS and 1-100 parts organophosphorus compds. I [R1, R4 = H, C1-5 aliphatic hydrocarby], (un) substituted Ph, naphthyl, anthryl; R2, R3, R5, R6 = (un) substituted Ph, naphthyl, anthryl; R2, R3, R5, R6 = (un) substituted Ph, naphthyl, anthryl]. Thus, a molding comprising 100 parts Santac UT 51 (ABS resin) and 15 parts 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-bis(dipheny)methyl)-3,9-dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 98%, and no burn marks.
47%101-76-97, 24,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-bis(dipheny)methyl)-3,9-dioxide
RL: INF (Industrial manufacture); MOA (Modifier or additive use); PRP (Proportices); TEM (Technical or engineered material use); PRP (Froparation:, USES (Uses) (heat-and fire-resistant transparent ABS resin-based compns. containing tetraoxadiphosphaspirondecanes)
475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9CI) (CA INDEX NAME)

Halogen-free styrene polymer compositions with good flowability and heat and fire resistance, and their moldings

Results 10/541021 39 of 76 Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s as ifreproofing agents for resins
Imamura, Koichi; Tanabe, Seiichi; Ando, Shinichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JXXXAF
Patent Japanese FAN.CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE PI JP 2004018387 A 20040122 PRAI JP 2002-171213 20020612 OS CASREACT 140:111527; MARPAT 140:111527 Α... JP 2002-171213 20020612

The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R8 = same as above) having purity 295% in the presence of halogenated compds. at 120-250°, Thus, II (R1-R8 = H, Ar1 = Ar2 = Ph; purity 99%) was heated in the presence of Ph(CH2)2Br at 180° to give I (R1-R8, Ar1, Ar2 = same as above) showing purity 99% with selectivity 92%.

60024 497-20, 3,9-8is(2-phenylethy) 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5) undecane 3,9-dioxide
RL; HPF (Industrial manufacture); SPN (Synthetic preparation); PREF (Handstrial)

(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

fireproofing agents for resins by heating corresponding diphosphites with halogen compds.)
62284-92-8 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 38 of 76 Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 20 pp. CODEN: JKXXAF DТ Patent FAN. CN APPLICATION NO. PATENT NO. KIND DATE DATE PI JP 2004018627 PRAI JP 2002·173996 OS MARPAT 140:129119 GI 20020614 JP 2002-173996 20020614

$$Ar^{1} = \begin{cases} \begin{pmatrix} Ar^{3} \end{pmatrix}_{p} & & & \\ & Q & & \\ &$$

The compns, comprise (A) styrene polymers 100, (B) polyphenylene ethers 1-100, and (C) organic P compds. I (Ar1-4 = Pn, naphthyl, anthryl; R1-4 = H, C1-5-aliphatic hydrocarbon group; Ph, naphthyl, anthryl; All, Al2 = C1-5-aliphatic hydrocarbon group; p, q = 0-3; Ar3 and Ar4 may link to atoms in All and Al2) 1-100 parts. Thus, a composition comprising 2.4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(2-phenylethyl) - 3,9-dioxide, a high-impact polystyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molded to give a test piece showing limiting 0 index (LO1) 22.3%, heat distortion temperature 83°, flowability (MVR) 12.6 cm3/10 min, and UL 94 fire resistance rating V0.
52284-92-9P, 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide
K1: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREF (Preparation), USES (Uses)

(Gireproofing agent; pentaerythritol diphosphonate fireproofing agents for styrene polymer compns. with good flowability and heat resistance) 62284-92-5 CAPLUS 2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/041021 L LUSHER 19 OP 62 CAPLUS COPYRIGHT 2007 ACS ON 2004 195599 CAPLUS PAUL ROXE 140:112216
Pentaerythritol spirocyclic diphosphonates as fireproofing agents with no Nalogen gas generation in kneading with resins
Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Kolchi, Tanabe, Selichi
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF PA SO DT Patent LA Japanese FAN.CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE 20040122 JP 2004018383 JP 2002-171209 20020612 PRAI JP 2002-171209 OS MARPAT 140:112 GI MARPAT 140:112216

The diphosphonates I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) have content of total residual halogen of ≤ 3000 ppm and ionic halogen of \$1000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts 1 (Ar1 - Ar2 - Ph, R1-R8 - H; total residual halogen 120 ppm, ionic halogen 41 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times.

F2261-92-3P
REL IMP (Industrial manufacture); MOA (Modifier or additive use);
PEGE (Fregaration); USES (Uses)
(pentaerythritol spirocyclic diphosphonates as (ireproofing agents with
no halogen gas generation in kneading with resins)
62244-92-8 CAPLUS

2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)



AN 2004:55598 CAPLUS COLVERGE 2007 ACS ON STR.

2004.55598 CAPRUS PUTILIERL 140:112215 Pentaerythritol spirocyclic diphosphonates as fireproofing agents with no

DT Patent LA Japanese FAN.CNT 1

A 0040122 20020612 PATENT NO. APPLICATION NO. DATE PI JP 2004018382 PRA1 JP 2002-171208 OS MARPAT 140:112215 GI JP 2002-171208 20020612

$$Ar^{1} = \begin{pmatrix} R^{1} & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 0 & R^{3} & 0 \\ \frac{1}{2} & 0 & 0 \end{pmatrix} \begin{pmatrix} R^{3} & 0 & 0 \\ \frac{1}{2} & 0 & 0 \end{pmatrix}$$

The diphosphonates I (Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) have content of total residual halogen of \$3000 ppm and ionic hydrocarbyi) have content of total residual halogen of \$3000 ppm and ionic halogen of \$1000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts I (Ari - Ar2 - Ph. Rr. R4 - H, total residual halogen 100 ppm, ionic halogen 36 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2 and good appearance. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection mold after molding 500 times. No deposition was observed in the injection of 4.8, 10-Tetraoxa-3, 9-diphosphaspiro(5.5) undecane, 3,9-bis(diphosphaspirofing agents with no halogen gas generation in kneading with resins) 20544-37-0 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5) undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAMB)

$$\begin{array}{c} 0 \\ Ph-cH_2 \end{array} \\ \begin{array}{c} 0 \\ 0 \\ \end{array} \\ \begin{array}{c} 0 \\ 0 \\ \end{array} \\ \begin{array}{c} 0 \\ 0 \\ \end{array} \\ \begin{array}{c} CH_2-Ph \\ 0 \\ \end{array}$$

475101-74-7 CAPLUS 2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-3.9-dioxide (9C1) (CA INDEX NAME)

Results 10/541021

43 of 76

(S IU/341021

225MP) 100, 3,9-di(2-phenylethyl)- 2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide (II) (acid value 0.03 mg KOH/g, purity
994) 5, and PTFE (Polyflon MPA-FA 500) 0.2 part showed UL-94 flammability
rating V-0, vs. V-1, for a test piece containing II with acid value 1.7 mg
KOM/g.
62244-WE-2P, 3,9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide
RE: IMP (Industrial manufacture); MOA (Modifier or additive use);
PREP (Preparation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin compns.)

compns.)
624,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSMER 15 007 ST NCARDUST COMMRIGHTS 2007 ACSTON STIN

AN ZUGISSIS CAPLUS FOIL-LEXU
DN 140:112209
140:112209
17 Flame retardant thermoplastic polycarbonate resin compositions and molded articles
IN Yamanaka, Katsuhiro, Taketani, Yutaka
PA Teijin Chenicals Ltd., Japan
S Jpn. Kokai Tokkyo Koho, 39 pp.
CODEN: JKXXAP
DP Patent
LA Japanese
FAN.CNT I
FAN.

JP 2004018765 JP 2002-178368 MARPAT 140:112209 0040122 20020619 Α JP 2002-178368 PRAI JP OS MAI GI

The compas., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing 250% polycarbonates and 1-100 parts I [R1, R4 = H, C1-5 aliphatic hydrocarbyl, R3, R6 = C1-5 aliphatic hydrocarbyl, R2, R5 = (un)substituted Ph, naphthyl, anthryl) having an acid value of \$0.7 mg KOH/g and a purity of ≥90%. Thus, a test piece prepared from polycarbonate

20020619

Results 10/541021

42 of 76

475101-76-9 CAPLUS 2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(diphonylmethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

ANAMER 30 OF 1621 CAPLUS COPYRIGHT 2000 ACS COMMENT AN 2004:52963 CAPLUS Full-text

140:112210

DN TI 140:112210
Flame retardant thermoplastic polycarbonate resin compositions and molded articles
Yamanaka, Katsuhiro, Taketani, Yutaks
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN, JKXXAF

Patent

LA Japanese FAN.CNT 1

GI

PATENT NO. PI JP 2004018766 PRAI JP 2002-178369

MARPAT 140:112210

DATE KIND 040122 20020619

APPLICATION NO. JP 2002-178369

DATE 20020619

0 0 (Ar4)q Y___L2__CR3R4_Ar2

The compns., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing ≥50% polycorbonates and 1-100 parts I lAr1-Ar4 = (un) substituted Ph, naphthyl, anthryl; Ll, L2 = C1-5 aliphatic hydrocarbon group; R1-R4 = H, C1-5 aliphatic hydrocarbon group; R1-R4 = H, C1-5 aliphatic hydrocarbyl. (un) substituted Ph, naphthyl, anthryl; p, q = 0-3) having an acid value of ≤0.7 mg K0H/g and a purity of ≥90%. Thus, a test piece prepared from polycarbonate (Panlite L

Results 10/541021

44 of 76

(Panlite L 1225WP) 100, 3,9-di(u-methylbenzyl)-2.4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane 3,9-dioxide (II) (acid value 0.03 mg KOH/g, purity 99%) 5, and PTFE (Polyflom MPA-PA 500) 0.2 part showed UL-94 flammability rating V-0, va. V-1, for a test piece containing II with acid value 2.1 mg KOH/g.

KOH/G. 475101-74-7P, 3,9-Bis(α-methylbenzyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane 3,9-dioxide RL: IMP (Industrial manufacture), MOA (Modifier or additive use), PREP (Preputation), USES (Uses) (halogen-free fireproofing agents for thermoplastic polycarbonate resin componal.

compns.)
47-7 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ANSHER SO OF 62 CAPLUS COPYRIGHT TOOM ACS TO THE STATE OF

2004:52961 CAPLUS Pull-text
140:11208
Flame retardant thermoplastic polycarbonate resin compositions and molded Flame retardant thermoplastic polycart articles Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 41 pp. CODEN: JKXXAF

IN PA SO

DT

Patent Japanese

FAN. CNT 1

PATENT NO. PI JP 2004018764 PRAI JP 2002-178367

А MARPAT 140:112208

KIND

DATE 0040122 20020619

JP 2002-178367

APPLICATION NO.

DATE 20020619

The compns., having good heat resistance and processability, comprise 100 parts thermoplastic resins containing $\geq 50\%$ polycarbonates and 1-100 parts [R1, R2 = (un) substituted Ph, naphthyl, anthryl] having an acid value of ≤0.7

mg KOH/g and a purity of ≥90%. Thus, a test piece prepared from polycarbonate (Panlite L 1225MP) 100, 1,9-dibenzyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (II) (acid value 0.06 mg KOH/g, purity 99%) 5, and PTFE (Polyflom MPA-FA 500) 0.2 part showed UL-94 flammability rating V-0, vs. V-1, for a test piece containing II with acid value 2.5 mg KOH/g.
20544-37-0P

2054-37-09
RE: IMF (Industrial manufacture); MOA (Modifier or additive use);
FREE (Preparation); USES (Uses)
(halogen-free fireproofing agents for thermoplastic polycarbonate resin

compns.)
20.44-37-0 CAPLUS
2.4.8,10-Tetraoxa-3.9-diphosphaspiro{5.5}undecane. 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

ATELIER OF 69 69 CAPAUS COPYRIGHT 2000 AGS ON SHE

CAPLUS Full-text

2004:52945 140:112462

hatogen-free heat- and fire-resistant transparent ABS resin-based compositions containing organophosphorus compounds and their moldings Yamanaka, Katsuhiro, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 33 pp. CODEN: JXXXAF

APPLICATION NO.

JP 2002-177295

DATE

DATE

20020614

20020618

DT LA Patent

Japanese

PATENT NO.

KIND DATE 20040122 PI JP 2004018732 PRAI JP 2002-177295

MARPAT 140:112462

Title compns. contain 100 parts polymers containing ≥60% ABS and 1-100 parts organophosphorus compds. I (R1, R4 = H, C1-5 aliphatic hydrocarbyl; R3, R6 = C1-5 aliphatic hydrocarbyl; R2, R5 = (un)substituted Ph, naphthyl, anthryl}. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane-3,9-di- α-methylbenzyl-3,9-

Results 10/541021

47 of 76

RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PRP (Properties); TBM (Technical or engineered material use); PREP (Preparation); USES (Uses) (heat- and fire-resistant transparent ABS resin-based compns. containing

tetraoxadiphosphaspiroundecanes)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

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ANSMER TROP CA MARROS GORRACHT 200R ACS.on SPN
2004:5288 CAPLUS FUll-text
140:12918
Halogen-free styrene polymer compositions with good flowability and heat
and fire resistance, and their moldings
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 25 pp.
CODEN: JKXXAF
Patent
JANANSSE

LA Japanese FAN.CNT 1

PATENT NO.

APPLICATION NO. DATE KIND 2040122 PI JP 2004018628 PRAI JP 2002-173997 JP 2002-173997 20020614

MARPAT 140:129118

- The compns. comprise (A) 100 parts resins containing 250% styrene polymers and (B) 1-100 parts organic P compds. I (R1, R4 = H, C1-5-aliphatic hydrocarbon group, Ph. naphthyl, anthryl) R2, R3, R5, R6 = Ph. naphthyl, anthryl). Thus, a composition comprising 2.4.8,10-tetraoxa-3.9- diphosphaspiro[5.5]undecane. 3,9-bis(diphenylmethyl)-3,9-dioxide and a high-impact polystyrene (Styron H 9152) was injection-molded to give a test piece showing limiting 0 index (LOI) 21.7%, heat distortion temperature 22°, [lowability [MVR] 32.4 cm3/10 min, and UL 94 fire resistance rating V2.
 475101-76-47, 2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide
 RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM
- ſТ

Results 10/541021

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dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 95%, and no burn marks. 475101 74-7P

475101 74.7P
RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PRP
(Properties); TEM (Technical or engineered material use); PREP
(Preparation); USES (Uses)
(heat- and fire-resistant transparent ABS resin-based compns. containing
tetraoxadiphosphaspiroundecanes)
475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)3,9-dioxide (9CI) (CA INDEX NAME)

ANSUES OF SECULOR COEVERSUS 2007 ASS OF SUI

140:112461

140:112461 Malogen-free heat- and fire-resistant transparent ABS resin-based compositions containing organophosphorus compounds and their moldings Yamanaka, Katsuhiro; Taketani, Yutaka Teijin Chemicals Ltd., Japan

so Jpn. Kokai Tokkyo Koho, 33 pp. CODEN: JKXXAP

DΤ Patent

Japanese

FAN. CNT 1

KIND APPLICATION NO. PATENT NO. DATE DATE 040122 PI JP 2004018731 PRAI JP 2002-177294 OS MARPAT 140:112461 GI JP 2002-177294 20020618

Title compns. contain 100 parts polymers containing \geq 60% ABS and 1-100 parts organophosphorus compds. I [R1, R2 = (un)substituted Ph, naphthyl, anthryl] with acid value \leq 0.7 mg KOM/g. Thus, a molding comprising 100 parts Santac UT 61 (ABS resin) and 15 parts 2,4.8,10-tetraoxa-3,9-dibynaphraspiro[5,5]undecane-3,9-dibenzyl-3,9-dioxide showed UL-94 flammability rating V-2, heat distortion temperature retention 98%, and no burn marks. \geq 05%:-13-29

Results 10/541021

48 of 76

(Technical or engineered material use); FEEL (Preparation); USES

(Uses)

(fireproofing agent; pentaerythritol diphosphonate tireproofing agents for styrene polymer compns. with good flowability and heat tesistance)
475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Ansher ad or ex: Caring Corynachit 2009 ace on Sid

ANSWER 4DE OF 681 CREATUS COPERIGHT 2000 AGS on STD: 2004:52887 CAPLUS FUll-text
140:129117
140:129117
Halogen-free styrene polymer compositions with good flowability and fire and heat resistance, and moldings using them
Yamanaka, Katsuhiro; Taketani, Yutaka
Teijin Chemicala Ltd., Japan
Jpn. Kokai Tokkyo Koho, 20 pp.
CODEN: JKXXAF
Pateri

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DT

Patent Japanese

FAN. CNT 1

PATENT NO. PI JP 2004018625 PRAI JP 2002-173994 OS MARPAT 140:120 KIND DATE APPLICATION NO. DATE A 10040122 JP 2002-173994 20020614 MARPAT 140:129117

The compns. comprise (A) styrene polymers 100, (B) polyphenylene ethers 1-100, and (C) organic P compds. I (R1, R2 = Ph, naphthyl, anthryl) 1-100 parts. Thus, a composition comprising 2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dibensyl-1,9-dioxide, a high-impact polystyrene (Styron H 9152), and polyphenylene ether (Zylon) was injection-molided to give a test place showing limiting 0 index (L01) 24.73, heat distortion temperature 89*, flowability (MVR) 12.3 cm3/10 min, and UL 94 fire resistance rating V0.

20544-37-0P, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-. 3,9-dioxide
RL: INF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); FEEF :Preparation; USES

Results 10/541021

49 of 76

(Uses)

(Tuses)
 (fireproofing agent, pentaerythritol diphosphonate fireproofing agents
 for styrene polymer compns. with good flowability and heat resistance)
20544-37-0 CAPLUS
2.4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

2004:52867 CAPLUS Full-text

2004;52867 CAPLUS Full-text
140;11248
Flame-retardant nonhalogen aromatic polyester compositions and their
moldings
Yamanaka, Katsuhiro, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Japn. Kokai Tokkyo Koho, 38 pp.
CODEN: JXXXAF
Patent
Japanese
CMT 1

FAN. CNT 1 PATENT NO. PI JP 2004018586 PRAI JP 2002-172651 MARPAT 140:112448

KIND DATE

20040122

APPLICATION NO. JP 2002-172651

DATE 20020613

The compns. comprise (A) resins containing 260% aromatic polyesters 100. (B) organic P compds. I (R1, R4 = H, C1-5-aliphatic hydrocarbyl, Ph, naphthyl, anthryl; R2, R3, R8, R6 = Ph, naphthyl, anthryl; 1-100. (C) fireproofing resins 0-50, and (D) tillers 0-200 parts. Thus, a 1.6-mm-thick specimen from a composition of 100 parts TRB H (PBT) and 20 parts 2,4.8,10-tetraoxa-3,9-diphosphaspiro(5.5) undecans 3,9-bis(diphenylmethyl)-3,9-dioxide (preparation described) showed UL 94 fire resistance rating V0 and LOI (limiting O index, JIS X 7201) 28.0.
47510; 76 PF, 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5] undecans 3,9-bis(diphenylmethyl)-3,9-dioxide
RI: IMF (Industrial manufacture), MOA (Modifier or additive use), TEM (Technical or engineered material use), PREP (Preparation), USES (Uses)

Results 10/541021

51 of 76

RL: IMF (Industrial manufacture); MOA (Modifier or additive use);

(SES (Proparation); USES (Uses)

(aromatic polyester composition containing organic phosphate fireproofing)

Lori halogen-tree molding) 62284-92-8 CAPUUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

ANSWER 404.07.62 CARBUS COPYRIGHT DOOY ACS CONSTRUCT.

AN 2004:52779 CAPBUS Pull-text

DN 140:111522

T1 Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s
as fireprooring agents for resins

N Yanagida, Takatsune: Tanabe, Seiichi; Imamura, Koichi; Taketani, Yutaka

PA Teijin Chemicals Ltd.. Japan

O Jpn. Kokai Tokkyo Koho, 17 pp.

CODEN: JUXXAF

DP Palent

Patent Japanese

PATENT NO. KIND - - - -A JP 2004018386

DATE 0040122 APPLICATION NO. JP 2002-171212 20020612

DATE 20020612

PRAI JP 2002-171212 CASREACT 140:111522; MARPAT 140:111522

$$Ar1 - c - b'$$

$$k^2 \quad o \quad o' \quad b \quad c - Ar^2$$

$$Ar1 - c - b' \quad o \quad o' \quad p - o \quad c - Ar^2$$

$$k^2 \quad o \quad o' \quad o' \quad b \quad c \quad ar^2$$

The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 ary1, R1-R4 = H, C6-20 ary1, C1-20 hydrocarby1) are prepared by heating II (Ar1, Ar2, R1-R4 = same as above) having purity 25% in the presence of halogenated compds, at 80-200°. Thus, II (R1-R4 = H, Ar1 = Ar2 = Ph; purity 98%) was heated in the presence of

Results 10/541021

50 of 76

(fireproofing agents, spirodiphosphate-fireproofed aromatic polyester-based resin compns. free from halogens)
475101-76-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl), 3,9-dioxide (9CI) (CA INDEX NAME)

TA ANSWER 19 07 02 CAPLUS CONVEIGHT 2007 ACS ON STN

140:112203

DN 140:11203
TI Aromatic polyester composition containing organic phosphate fireproofing agent and molding of the composition
IN Yamanaka, Katsuniro, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 42 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE APPLICATION NO. KIND A DATE PI JP 2004018585 PRAI JP 2002-172650 OS MARPAT 140:112203 GI 20020613 JP 2002-172650 20020613

The composition contains 100 parts of a resin containing 260% of an aromatic polyester, 1-100 parts of the organic phosphate I (Ar1, Ar2 = Ph, naphthyl, anthryl; R1-R4 = H, C1-5 aliphatic hydrocarbyl, Ph, naphthyl, anthryl; AL1, AL2 = C1-5 branched or linear aliphatic hydrocarbyl; Ar3, Ar4 = Ph, naphthyl, anthryl; p, q = 0-3; each of Ar3 and Ar4 may be linked with AL1 and AL2; Ph, naphthyl, and anthryl may be substituted with aromatic ring) as the claimed fireproofing agent, 0-50 parts of a resin for improvement of fire resistance, and 0-200 parts of a filler. The composition is molded to give the halogen-free fire-resistant molding. Thus, 100 parts poly(butylene terephthalate) (TRB-H) and 15 parts 2.4,8.10-terrooxa-3,9-diphophaspiro(1.5) undecane 3,9-di(2-phenylethyl)-3,9-dioxide were blended, mixed with chopped glass fiber, and injection-molded to give test pieces UL-94 flame retardance V-0 and limiting oxygen index (LOI) 27.5.

Results 10/541021

52 of 76

PhCHZBT at 150° to give I (R1-R4, Ar1, Ar2 = same as above) showing purity 99% with selectivity 95%.
20544-37-09, 3,9-Dibenzyl-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide 475101-74-79
475101-76-99, 3,9-Bis(benzhydryl)-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5.5]undecane 3,9-dioxide
Ri. IMF (Industrial manufacture); SPN (Bynthetic preparation); PREP

(preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s

fireproofing agents for resins by heating corresponding diphosphites

with halogen compds.)
20544-37-0 CAPLUS
24,48,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS 2,4,8,10-Tetraox-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphonylmethyl)-, 3,9-dioxide (9C1) (CA INDEX NAME)

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100:1152/78 CAPUS FULL TEXT
10

Results 10/541021 Jpn. Kokai Tokkyo Koho, 13 pp. CODEN: JKXXAF Patent Japanese FAN. CNT 1 PATENT NO. PATENT NO. KIND DATE
PI JP 2004016385 A 2040122
PRAI JP 2002-171211 20020612
OS CASRBACT 140:111521, MARPAT 140:111521 APPLICATION NO.
JP 2002-171211 DATE

The title bis(phosphonate)s I (Ar), Ar2 * C6-20 aryl, R1-R8 * H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R8 * sme as above) in the presence of halogenated compds. at 120-250*. For decreasing content of residual volatile substances to \$5000 pps. the crude I may be washed with RSOH (R5 * C1-10 alkyl) at \$0-120*. Thus, II (R1-R8 * H, Ar1 * Ar2 * Ph) was heated in the presence of Ph(CH2)2br at 180°, filtered. refluxed with MeOH, washed with MeOH, and dried to give 87% I (R1-R8, Ar1, Ar2 * aame as above) showing purity >99% and content of residual volatile substances 300 pps.

52284-V0.*8P, 3,9-Bis(2-phonylethyl)-2,4,8,10-tetraoxa-3,9diphosphaspiro(5.5) undecane 3,9-dioxide
RL: IMF (Industrial manufacture): PUR (Purification or recovery); SPN (Synthetic preparation); PFEP (Prophration); (preparation of low-volatile pentaerythricol spirocyclic bis(phosphonate)s as fireproofing agents for resins by heating corresponding diphosphites with halogen compds.)

62284-92-8 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5) undecane, 3,9-bis(2-phenylethyl)3,9-dioxide (9C1) (CA INDEX NAME)

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Results 10/541021

55 of 76

475101-74-7 CAPLUS 2,4,8,10-Tetraox-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

475101-76-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5] undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

SA 49 05 62 GNPHUS COPYRIGHT 2007 ACS ON SING

ZDE4:75776 CAPLUS Full-text.
140:112200
Low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing agents for resins
Taketani, Yutaka; Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi Teijin Chemicale Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF

Patent Japanese

DT Pat LA Jag FAN.CNT

ENT 1 PATENT NO. APPLICATION NO. DATE KIND A DATE JP 2004018381 20040122 JP 2002-171207 20020612

PRAI JP 2002-171207 OS MARPAT 140:112200 GI

Results 10/541021

INS NW-941021

Preparation of low-volatile pentaerythritol spirocyclic bis(phosphonate)s as fireproofing agents for resins Imamura, Kolchi; Tanabe, Selichi; Yanagida, Takatsune; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN; JKXXAF
Patent
Japanese
CNT 1

54 of 76

DT Pac LA Japanes FAN.CNT 1 PATENT NO. KIND DATE A 20040122 APPLICATION NO. DATE PI JP 2004018384 A 20040122 PRAI JP 2002-171210 20020612 OS CASREACT 140:111520; MARPAT 140:111520 JP 2002-171210 20020612

The title bis(phosphonate)s I (Ar1, Ar2 * C6-20 aryl; R1-R4 * H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by heating II (Ar1, Ar2, R1-R4 * same as above) in the presence of halogenated compds. at 80-200*. For decreasing content of residual volatile substances to \$5000 pm, the crude I may be washed with R5OH (R5 * C1-10 alkyl) at \$0-120*. Thus, II (R1-R4 * H, Ar1 * Ar2 * Ph) was heated in the presence of PhORIZBr at 150*. filtered, refluxed with MeOH, washed with MeOH, and dried to give 82* I (R1-R4, Ar1, Ar2 * same as above) showing purity >99% and content of residual volatile substances \$00 ppm.

above) showing purity >99% and content of residual volatile substances 500 ppm.

3984-37-07, 3,9-Dibenzyl-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5,5]undecane 3,9-dioxide 475101-74-1F,
475101-76-9F, 3,9-Bis(diphenylmethyl)-2,4,8,10-Tetraoxa-3,9diphosphaspiro[5,5]undecane 3,9-dloxide
RL: INF (Industrial manufacture); PUR (Purification or recovery); SPN
(Synthetic preparation); FEEP (Fregaration)
(preparation of low-volatile pentaerythritol spirocyclic bis(phosphonate)s
as fireproofing agents for resins by heating corresponding diphosphites
with halogen compds.)

20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

Results 10/541021

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The diphosphonates I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) have content of residual volatile substances of \$5000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (A88) and 15 parts I (Ar1 - Ar2 = Ph, R1-R8 = H; residual volatile substance 400 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2. No deposition was observed in the injection mold after molding \$500 times.

Aca*** '4', RL: MF* (Industrial manufacture), MOA (Modifier or additive use), PFEI (FireArtion:) USES (Uses)

(low-volatile pentserythritol spirocyclic diphosphonates as fireproofing agents for resins)

62284-92-8 CAPUS

2,4,8,10-7etracaxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME) IT

140:112199 Low-volatile pentaerythritol spirocyclic diphosphonates as fireproofing

gonts (or resins
Taketani, Yutaka; Yamanaka, Katauhiro; Imamura, Koichi; Tanabe, Seiichi
Telian Taketani, Yutaka; Yamanaka, Katauhiro; Imamura, Koichi; Tanabe, Seiichi
Telian Tokkyo Koho, 15 pp.
CODEN: JKXXAF

PA SO

DT

DT Patent LA Japanese FAN.CNT 1 PATENT NO. DATE 20040122 20020612 KIND APPLICATION NO. DATE PI JP 2004018380 PRAI JP 2002-171206 OS MARPAT 140:112199 GI JP 2002-171206 20020612

$$Ar^1 - \begin{matrix} R^1 & 0 \\ L^2 & V \\ Ar^2 \end{matrix}$$

The diphosphonates I (Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) have content of residual volatile substances of \$5000 ppm. Thus, pellets comprising 100 parts Suntac UT 61 (ABS) and 15 parts I (Ar1 = Ar2 = Ph. R1-R4 = H; residual volatile substance 150 ppm) were injection-molded to give a test piece showing fire resistance (UL 94) V-2. No deposition was observed in the injection mold after molding 500 times.

. ÷ °

31

20564 (7-07 4)3(2)-74-77 475(0)-76-79, 2,4,8.10-76-79, 75-76-79, 2,4,8.10-76-79, 75-76

475101-74-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS 2.4.8, 10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(diphenylmethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

SHER 51 OF 62 CAPLUS T. COPYRIGHT 2007 ACS ON STN

Results 10/541021

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CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004,12509 CAPILIS SULL FAME

Full-text

140:94927

Preparation of pentaerythritol diphosphonates with low yellowness index

Preparation of pentaerythritol diphosphonates with low yellowness index and good hue
Taketani, Yutaka, Yamanaka, Katsuhiro, Imamura, Koichi, Tanabe, Seiichi
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF
Patent

PA SO

DT

MARPAT 140:94927

LA Japanese FAN.CNT 1

PATENT NO.

KIND JP 2004010589 PRAI JP 2002-169891

DATE 20040115 20020611

APPLICATION NO. JP 2002-169891

DATE 20020611

Ar1-6-6-N 0 0 0 R5 R7

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl, R1-R8 = H, (un)substituted C6-20 aryl, C7-30 aralkyl, (un)saturated C1-20 hydrocarbyl) having yellowness index (YI) S8, L value 265, a value 50.5, and b value 54.0, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephchalate (TRB-H) and 20 parts 3,9-di(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-

Results 10/541021

58 of 76

Preparation of pentaerythritol diphosphonates with low acid value Taketani, Yutaka, Yamanaka, Katsuhiro, Imamura, Koichi, Tanabe, Selichi Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 14 pp. CODEN: JXXXAF

CODEN: JKN
DT Patent
LA Japanese
FAN.CNT 1
PATENT NO.

PI JP 2004010586 PRAI JP 2002-169888

APPLICATION NO. 10040115 20020611

DATE

MARPAT 140:94947

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl; R1-R4 = H, (un)substituted C6-20 aryl, (un)saturated C1-20 hydrocarbyl), having an acid value of S0.7 mg KOH/g and a purity of 294%, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polyburylene terephthalate (TRB-H) and 20 parts 3.9-dibensyl-2.4, 8.10-terraoxa-3.9-diphosphaspiro[5.5]undecene 3.9-dioxide (II) (acid value 0.06 mg KOH/g, purity 99%) showed UL-94 flammability rating V-0, vs. V-2, for a test piece containing II with acid value 2.5 mg KOH/g. 20544-37-0P 475101-74-7P 475101-76-5P RL: IMP (Industrial manufacture); MOA (Modifier or additive use); PREP (Progration); USES (Uses) (preparation) of pentaerythritol diphosphonates with low acid value for fireproofing agents) (2044-37-0 CAPUS 2.4,4,10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(phenylmethyl)-, 3.9-dioxide (CA INDEX NAME)

475101-74-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (SCI) (CA INDEX NAME)

Results 10/541021

60 of 76

diphosphaspiro[5.5]undecane 3.9-dioxide (YI 1.08, L 95.95, a -0.17, b 0.53) showed UL-94 flammability rating V-0.
62294-92-3P, 3.9-Bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane3,9-dioxide
RL: IMF (Industrial manufacture); MOA (Modifier or additive use);
FREEP (Proparation); USSS (Uses)
(preparation of pentaerythritol diphosphonates with low yellowness index

fireproofing agents)
62284-92-8 CAPUUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

AN 2004:32608 CAPLUS FULL EXX

AN 2004:32608 CAPIUS FULLTEX

DN 140:94926
T Preparation of pentaerythritol diphosphonates with low yellowness index and good hue
IN Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi
PA Teijin Chemicals Ltd., Japan
S Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
P Patent
LA Japanese
FAN.CNT 1
PATENT NO, KIND DATE APPLICATION NO. DATE

KIND ----PI JP 2004010588 PRAI JP 2002-169890 OS MARPAT 140:94926 GI

20020611 20020611

JP 2002-169890

20020611

The title compds. I [Ar1, Ar2 = (un)substituted C6-20 aryl; R1-R4 = H, (un)substituted C6-20 aryl; (un)saturated C1-20 hydrocarbyl), having yellowness index (Y1) S8, L value 285, a value 50.5, and b value 54.0, are prepared The compds. are especially useful as fireproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene teraphthalate (TRB-H) and 20 parts 3,9-dibenzyl-2,4,8,10- tetraoxa-3,9-diphosphaspiro[5.5]undecane

3.9-dioxide (YI 3.10, L 95.57, a -0.27, b 1.65) showed UL-94 flammability rating V-0 and good hue. 25444-27-09 475101-47 479 475101-76-9P RL: IMF (Industrial manufacture); MOA (Modifier or additive use); FPEP (Preparation); USES (Uses) (preparation of pentaerythritol diphosphonates with low yellowness index

fireproofing agents)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(1-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS 2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-,3,9-dioxide (9C1) (CA INDEX NAME)

ANSHER SA OF 62 CAPLUS COPYRIGHT 2007 AGS ON STAN AN 2004:32607 CAPLUS Full-Lext DN 140:94925

140:94925
Preparation of pentaerythritol diphosphonates with low acid value
Taketani, Yutaka, Yamanaka, Katsuhiro; Imamura, Koichi; Tanabe, Seiichi
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN; JXXXAF

DT Patent

LA Japanese FAN.CNT 1

Results 10/541021 63 of 76 030925 PI JP 2003267984 PRAI JP 2002-66600 JP 2002-66600 20020312 CASREACT 139:277001; MARPAT 139:277001

The title compds. I [R1, R4 = H, Ar(R7)n; R2, R3, R5, R6 = Ar(R7)n; Ar = Ph, naphthyl, anthryl, pyridyl, thiazyl; n = 0.5; R7 = Me, Et, Pr. Bu, aryloxy, arylthio, etc.] are prepared by reaction of pentaerythritol with phosphonic actid dinalides. E.g., pentaerythritol (468.1 g) was esterified with 2058.5 g Ph2cHP(0)Cl2 (preparation given) in ChCl3 in the presence of pyridine at 60° for 6 h to give 1186.2 g I (R1 = R4 = H, R2 = R3 = R5 = R6 = Ph), which was added to polypropylene at 30 phr and injection-molded to give a test piece showing fire resistance (UL 94) V-2.
475101.76.90

475:01-76-92
RI: IMP (Industrial manufacture); MOA (Modifier or additive use); SPN
(Synthetic preparation); PESP (Preparation), USES (Uses)
(preparation of pentaerythritol diphosphonates as fireproofing agents for polymers)
475:101-76-9 CAPLUS
2,4,8,10-76:reacoa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

Answer 35 of 62, Carbus Copyright 2007 ags on Stn? 2002:888823 Carbus <u>Full-text</u>

137:37085
Flame-retardant polyester-based resin compositions containing organic phosphorous compounds and molded articles therefrom Yamanaka, Katsuniro, Taketani, Yutaka
Teijin Chemicals, Ltd., Japan
PCT Int. Appl., 95 pp.
CODEN: PIXXD2

DT Patent LA Japanese FAN.CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE WO 2002092690 A1 20021121

CN, KR, US

WO 2002-JP4659 20020514 Results 10/541021 62 of 76

PATENT NO. KIND DATE APPLICATION NO. DATE PI JP 2004010587 PRAI JP 2002-169889 OS MARPAT 140:94925 20040115 20020611 JP 2002-169889 20020611

The title compds. I (Ar1, Ar2 * (un)substituted C6-20 aryl; R1-R8 * H, (un)substituted C6-20 aryl, C7-30 aralkyl, (un)saturated C1-20 hydrocarbyl, having an acid value of 50.7 mg KOH/g and a purity of 294%, are prepared The compds. are especially useful as firerproofing agents for resins. Thus, a test piece prepared from 100 parts polybutylene terephthalate (TRB-H) and 20 parts 3,3-bis(2-phenylethyl)-2,4,8,10-tetraoxa-3,9- diphosphaspiro(5.5]undecane 3,9 dioxide (II) (acid value 0.03 mg KOH/g, purity 993) showed UL-94 tlammability rating V-0, vs. V-2, for a test piece containing II with acid value 1.3 mg KOH/g,

rating V-0, vs. v-2, io. a case grand No. (No. V), io. a case grand No. (No. V), io. a case grand No. (No. V), io. (No. V) 22.4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5]undecane, 3,9-bis(2-phenylethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

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139:277001

DN TI Preparation of pentaerythritol diphosphonates and their use as

TI Preparation of pentaerythritol di fireproofing agents for polymers IN Ando, Shinichi; Taketani, Yutaka Parentin Chemicals Ltd., Japan SO Jpn. Kokai Tokkyo Koho, 12 pp. CODEN: JXXXAF DT Patent LA Japanese FAN.CNT 1

PATENT NO.

KIND DATE APPLICATION NO.

DATE

Results 10/541021 64 of 76

RM: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR
JP 2003034749 A 20030207 JP 2002-138136 20020514 A A1 EP 1408085 20040414 EP 2002-769597 20020514

AI 20040414 EF 2002-7659597 20020514
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, FI, CY, TR
109114 A 20040630 CN 2002-810103 20020514
2003160722 A 20030606 JP 2002-165449 20020606 CN 1509314 CN 1509314 JP 2003160722 JP 2003213109 US 2004127611 20040630 20030606 20030730 20040701 20060808 20051117 20010515 20010917 20011113 20020514 JP 2002-165449 JP 2002-165450 US 2003-476390 US 7087667
US 2005256293
PRAI JP 2001-144478
JP 2001-281268
JP 2001-347212
WO 2002-JP4659
US 2003-476390
CS MARPAT 1371370855 97200551152872 20050615

Title compns. comprising (A) a resin component comprising ≥60 aromatic polyester resin 100, (B) a organophosphorus compound with acid value ≤0.7 mgKOH/g, (C) a resin for improving flame retardancy 0-50, and (D) a filler 0-200
parts, are substantially halogen free, and meet UL94 V-2 or meet UL94 V-0
under suitable conditions. Thus, 6.81 parts pentaerythritol and 13.76 parts
trichlorophosphine were reacted at 60° to give a 2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5] undecane, 3,9- dibydro-3,9-dioxide, 10,34 parts benzyl
bromide was added therein to give a 2,4,8,10-tetraoxa-3,9-
diphosphaspiro[5.5] undecane, 3,9-dibenzyl-3,9- dioxide with acid value 0.06 mgKOH/g, 15 parts of which was mixed with 100 parts TRB-H to give a composition
showing good flame retardancy.
20544-17-0P ACCR4-49-29-3B ATSIGI-74-7P
47512-76-5f
Rt. IMF (Industrial manutacture); MOA (Modifier or additive use);
EREP **Irragalai loci; USES (Uses)
(flame retardant; preparation of organic phosphorous flame retardants for
halogen free flame-retardant polyester resin compns.)
20544-37-0 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-,
3,9-dioxide (CA INDEX NAME) Title compns. comprising (A) a resin component comprising ≥ 60 aromatic

62284-92-8 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethyl)-,3,9-dioxide (9CI) (CA INDEX NAME)

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Results 10/541021

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475101-74-7 CAPLUS
2.4.8.10-Tetraoxa-3.9-diphosphaspiro[5.5]undecane, 3.9-bis(1-phenylethyl)-, 3.9-dioxide (9CI) (CA INDEX NAME)

475101-76-9 CAPLUS

3.01-76-7 GREGO 4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(diphenylmethyl)-3,9-dioxide (9CI) (CA INDEX NAME)

RECOT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

ANSHER 150 OF 521 SCAPLUS COPYRIGHT 2007 ACS-ON-STN D 1980:59635 CAPLUS Full-text

*** CONTRACTOR OF THE TOTAL PROPERTY OF THE

	PA?	FENT	NO.	
PI	US	4174	1343	
PRAI	US	1976	9032	94
G I				

KIND DATE 19791113

19780505

US 1978-903294

APPLICATION NO. DATE 19780505

Certain pentaerythritol diphosphonates (I, R = Me, Ph, benzyl, CN), containing ammonium polyphosphate (except for R = CN), give self-extinguishing,

Results 10/541021

72551-88 3 CAPLUS 2,4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(1-nghthalenylmethyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

72551-89-4 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[{4-bromophenyl}methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

2561-29-6 CAPLUS .4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[{4-hlorophenyl)methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)



ANSWERESS-OPECATIONS COPYRIGHT 2007 ACS.on.STN.

1978:511298 CAPLUS Full-text
Correction of: 1975:565050

89:111298
Correction of: 83:165050

Phosphonospirobisphenols as flame-resistant additives for resins

Results 10/541021

66 of 76

nondripping flame retardant compns, when added to polyolefins. Thus, polypropylene [9003-07-0] 70, dimethylpentaerythrityl diphosphonate [3001-98-7] 15, and ammonium polyphosphate 15 parts were extruded into cylindrical specimens which were exposed 10 s to a 3/4 in. blue flame. The samples did not ignite or melt drip.

20544-37-0

īТ

ZUSM4-31-0 (flame retardants, containing ammonium polyphosphate, for polyolefins) 20544-37-0 CAPLUS

2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethyl)-, 3,9-dioxide (CA INDEX NAME)

71325-90-9P 71325-82-1P 72551-87-2P 72551-83-1P 72551-85-9P RL: PREP (Preparation) (preparation of) 71325-80-9 CAPLS 2,4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[(4-methylphenyl)methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

71325-82-1 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[(2,4,6-trimethylphenyl)methyl)-, 3,9-dioxide (9CI) (CA INDEX NAME)

72551-87-2 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis[(2,4-dimethylphenyl)methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021

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Mueller, Albrecht, Renner, Alfred Ciba-Geigy A.-G., Switz. Ger. Offen., 23 pp. CODEN; GMXXBX

FAN	.CNT 1				
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	•••••				
PI	DE 2456532	A1	19750605	DE 1974-2456532	19741129
	CH 582195	A5	19761130	CH 1973-16895	19731203
	ES 432497	Al	19761101	ES 1974-432497	19741202
	GB 1487609	A	19771005	GB 1974-52111	19741202
	FR 2253024	A1	19750627	FR 1974-39479	19741203
	JP 50084587	A	19750708	JP 1974-140105	19741203
PRA	I CH 1973-16895		19731203		

JP 50044587 A 19730708 JP 1974-140105 19741203
The compds. I with R = 4(or 2)-hydroxy-3,5-dimethyl(or dichloro)phenyl, 2-hydroxyphenyl, or 2-hydroxy-15-methylphenyl were prepared The compds. had good hydrolysis resistance and were useful as diglycidyl ethers, for preparing fire-resistant resins. Thus, 270 g (4-hydroxy-3,5-dimethylbenzyl)dimethylamine (42900-95-8) and 223 g trimethyl phosphite (121-45-9) in 1,4-dioxane were refluxed to prepare dimethyl (4-hydroxy-3,5-dimethylbenzyl)phosphonate [56733-62-1] which (48.8 g) was mixed with 13.6 g pentaerythritol [115-77-5] in sulfolane and heated at 250-280° to prepare I (R = 4-hydroxy-3,5-dimethylphenyl) (II) [\$6733-67-6]. A mixture of 99.2 g II, 1 L epithorhydrin [106-89-8], and 4 g NR4Er was heated to 90-100°, cooled to 80°, and treated during 1 h with 24 g NaOWe to prepare II diglycidyl ether [f6733-68-7]. II and bisphenol A diglycidyl ether were used to prepare a nonburning resin.

56733-67-69

56733-67-69
RL: RCT (Reactant), SPN (Synthetic preparation); PREP
(Praparation): RACT (Reactant or reagent)
(preparation and reaction of, with epichlorohydrin)
56733-67-6 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5] undecane-3,9-dipl)bis(methylene)]bis[2,6-dimethyl(9CI) (CA INDEX NAME)

IT

56733-56-3F 56732-87-4P 56733-59-5P 56733-59-6P 56733-59-6P 56733-68-7P 56738-54-2P RL: PREF (Preparation)
(preparation of) 56733-56-3 CAPLUS
Phenol, 4,4'-[(2,4,8,10-tetraoxa-3,9-dioxido-3,9-diphosphaspiro[5,5] undecane-3,9-diyl)bis(methylene)}bis(2,6-dichloro-(9CI) (CA INDEX NAME)

$$\begin{array}{c} c_1 \\ \\ \\ \\ \\ \\ \\ \\ \end{array}$$

56733-57-4 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl)bis(methylene)|bis-(9CI) (CA INDEX

56733-58-5 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)]bis[4,6-dimethyl(9CI) (CA INDEX NAME)

56733-59-6 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)]bis[4,6-dichloro-(9CI) (CA INDEX NAME)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[[3,5-dimethyl-4-(oxiranylmethoxy)phenyl]methyl]-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021 71 of 76

51837-04-8 53833-06-0
RL: USES (Uses)
(antioxidant, for polypropylene, manufacture of)
53833-04-8 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5] undecane-3,9-diphosphaspiro[5,5] undecane-3,9-diyl)di-2,1-ethanediyl]bis[2,6-dimethyl-(9CI) (CA INDEX NAME)

\$3833-06-0 CAPLUS
Phenol, 4,4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane-3,9-diyl)bis(methylene)|bis[2,6-bis(1,1-dimethylethyl)- (9CI) (CA INDEX NAME)

819.3-95-9P
RL: PREP (Preparation)
(preparation of)
51833-05-9 CAPLUS
Phenol, 2,2'-1(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-diplibis(methylene))bis[6-(1,1-dimethylethyl)-4-methyl- (9CI) (CA INDEX NAME)

ANSWER 60 OPENAL CAPIDLES COPYR 1976:560318 CAPLUS Full-text TEARY OF THE SOOT ACS ON STIN

70 of 76

PAGE 1 . B

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56778-54-2 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl)bis(methylene)|bis[4-methyl-(GCI)(CA INDEX NAME)

ANSWER 59-69-62 CAPLUS ECOPYRIGHT 2007 AGS TOTASTIND
N 1977:90946 CAPLUS Full-text
DN 86:90946
TI Hindered phenol pentaerythritol phosphonate
IN Hechenbleikner, Ingenuin; Enlow, William P.
PA Borg-Marner Corp., USA
SO Brit., 8 pp.
CODEN: BRXXAA
DT Patent
LA English
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. A 19760609 A 19740417 DATE APPLICATION NO. PI GB 1439092 PRAI GB 1974-16786 19760609 19740417 GB 1974-16786 19740417

OB 1974-16786 A 19740417

Three title compds, were manufactured which were useful as antioxidants and fire retardants for polymers and rubbers. Thus, a mixture of 256 g 3,9-dimethoxy-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecame [7093-29-0] in 1. PhMe and 509 g 3,5-di-tetr-butyl-4-hydroxybenzyl chloride [955-01-1] in 500 ml heptane was heated 3 hr at 100-10°, distilling off NeCl, cooled, filtered, and washed with PhMe to give 90% 3,9-bis(3,5-di-tetr-butyl-4-hydroxybenzyl)-3,9-dioxo-2,4,8,10-tetraoxa-3,9- diphosphaspiro[5.5]undecame (1) [5-39-60]. Polypropylene [9003-07-0] powder was stabilized by blending with 0.5% [.

Results 10/541021 72 of 76

2,3,5-Trialkyl-4-hydroxybenzyl phosphonates and phosphinates spivack, John D.
Ciba-Geigy Corp., USA
U.S., 11 pp.
CODEN: USXXAM
Patent
Patent
CNT 2 ΤI

DT LA FAN

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 3962377	A	19760608	US 1974-492089	19740726
ZA 7405384	A	19750827	ZA 1974-5384	19740821
BE 820259	A1	19750324	BE 1974-148819	19740924
FR 2244759	A1	19750418	FR 1974-32107	19740924
DK 7405021	A	19750602	DK 1974-5021	19740924
GB 1476994	A	19770616	GB 1974-41429	19740924
NL 7412670	A	19750327	NL 1974-12670	19740925
JP 50060481	. А	19750524	JP 1974-110364	19740925
PRAI US 1973-400	601 A2	19730925		
G1				

The title compds, I [R = Me3C, Me3CCH2CHe2; R1 = R2 = EtO, BuO, MeO, Me(CH2)110, Me(CH2)170, Me(CH2)175CH2CH2O; R1 = Me(CH2)110, R2 = Ph] were prepared Thus, II was heated with (MeO)2POH in DMF at 60° apprx.20 hr to give I [R = Me3C, R1 = R2 = MeO). I are stabilizers for polymers subject to oxidative, thermal and photochem, degradation \$5719-65-2P\$
RL: SPN (Synthetic preparation); PREP (Frepaintion) (preparation of) \$5719-65-2P\$
Phenol. 4.4'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecame-3,9-diplibs(methylene)]bis[6-(1,1-dimethylethyl)-2,3-dimethyl- (9C1) (CA INDEX NAME)

IT

O CAPLUS Full-text

Quant Frid levore in EAST, etc pulls up incorrect DATE

DТ Patent German

FAN, CNT

PATENT NO. KIND DATE APPLICATION NO. 19760812 19741129

PATENT NO.

PATENT NO.

PATENT NO.

PATENT NO.

All 19760812 DE 1974-2456523 19741129

PRAI DE 1974-2456523 A 19741129

GI For diagram(s), see printed CA Issue.

AB The compds. It with R * 4 (or 2) - hydroxy-3,5-dimethyl(or dichloro) phenyl, 2-hydroxyphenyl, or 2-hydroxy-5-methylphenyl were prepared The compds. had good hydrolysis resistance and were useful. e.g., as diglycidyl ethers, for preparing fire-resistant resins. Thus, 270 g (4-hydroxy-3,5-dimethylbenyy) ldimethylamine [4290-95-8] and 223 g tri-hydroxy-3,5-dimethylbenyy) ldimethylamine [4290-95-8] and 223 g tri-hydroxy-3,5-dimethylbenyy) lphosphonate [56733-62-1] which (4-hydroxy-3,5-dimethylbenyy) [11] [5673-7-6], A mixture of 99. 2 g pentaerythricol [115-77-5] in sulfolane and heated at 250-280° to prepare I (R * 4-hydroxy-3,5-dimethylphenyl) [11] [5673-07-6], A mixture of 99. 2 g II, 1 l. spichlorohydrin (106-89-8), and 4 g NEtdBr was heated to 90-100°, cooled to 80°, and treated during 1 hr with 24 g NaOMe to prepare II diglycidyl ether [56732-68-7]. II and bisphenol A diglycidyl ether were used to prepare a nonburning resin.

to prepare a nonburning resin.

RL: USES (Uses)

(fire-resistant resins containing)

56733-67-6 CAPLUS
Phonol, 4,4'-(1,3)-dioxido-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane-3,9-diphosphaspiro[5.5]undecane-3,9-diphosphaspiro[6.5]undecane-3,9-diphosphaspiro[6.5]

56733-68-7 CAPLUS
2,4,8,10-Tertaox8-3,9-diphosphaspiro[5,5]undecane, 3,9-bis[[3,5-dimethyl-4-(oxiranylmethoxy)phenyl]methyll-, 3,9-dioxide (9CI) (CA INDEX NAME)

Results 10/541021

75 of 76

Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspirol5.5]undecane-3,9-diphosphaspirol5.5]undecane-3,9-diph)bis(methylene)]bis[4,6-dichloro-(9CI) (CA INDEX NAME)

56778-54-2 CAPLUS
Phonol, 2,2'-[(3,9'dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diyl)bis(mothylene)]bis[4-methyl-(9CI)(CA_INDEX_NAME)

ISMER 68 69 68 CAPHUE COLYRICHY ZUUV LIE ON STR 1

AN 1968:496974 CAPIUS CORVATORY 2009 ACS ON STD |

AN 1968:496974 CAPIUS TURN COTC.

AN 1968:496974 CAPIUS TURN COTC.

AN 1968:496974 CAPIUS TURN COTC.

TO 596974

TI Cyclic esters of phosphonic acids
PA CIBA Ltd.

O Fr., 20 pp.

CODEN: FRAXAK

DATE

PATENT NO.

KIND DATE

APPLICATION NO.

DATE

PATENT NO.

FRAICH 1

PATENT NO.

KIND DATE

APPLICATION NO.

DATE

1967:1124 FR 1966-86604 19661208

PRAI CH

FOR cidagram(s), see printed CA Issue.

AB The tile compds. which are used for modification and hardening of epoxy resins are prepared by treating compds. containing oxirane or oxetane rings with a phosphonic acid hemi-ester tollowed by internal transesterification of the hydroxy ester formed. Thus, 1096 g, 81POJ was heated 15-20 hrs. with 375 g, 1.4-dichloro-2-butene at 140 ; 5' until all EtCl was eliminated. The reaction mixture was fractionally distilled and a liquid major fraction (93.5%) was obtained at 149-52*/0.1-0.15 mm. This fraction (n2D0 1.4595) was hydrogenated for 6-7 hrs. in the presence of Pd-C or Raney Ni in dioxans. After separation of dioxane and hydrogenation catalysts, tetraethyl butanebisphosphonate (I) was obtained. I was heated 2 hrs. with 10% aqueous NOOM, and cooled to give a di-hemi-ester disodium salt, which was treated with Amberlite JR 120, decolorized with C, and filtered through Kieselguhr to give 660-70 g, di-hemiester (II) in the form of a viscous colorless liquid II was dissolved in absolute alc. and heated gently in the presence of 2 moles p-

Results 10/541021 74 of 76

PAGE 1-B

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56733-56-2 56733-57-4 56723-58-5 56733-59-6 56778-54-2 RL: USES (USES)

RL: USES (USES)
(fireproofing agents, for resins)
56733-56-3 CAPLUS
Phenol, 4,4'-[[2,4,8,10-tetraoxa-3,9-dioxido-3,9-diphosphaspiro[5,5] undecane-3,9-diyl)bis(methylene)]bis[2,6-dichloro-(9CI) (CA INDEX NAME)

S6733-57-4 CAPLUS
Phenol, 2,2'-[(3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane-3,9-diplois(methylene)]bis- (9CI) (CA INDEX

56733-58-5 CAPLUS Phenol, 2,2'-{{3,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphaspiro{5,5|undecane-3,9-diyl)bis(methylene)|bis{4,6-dimethyl-(CA INDEX NAME)

RN 56733-59-6 CAPLUS

Results 10/541021

76 of 76

toluidine for each mole II to give the di-p-toluidine salt (III), m. 117.8-8.6°. III could be convorted to the free hemi-eater by cation exchange resins. The hemi-eater by cation exchange resins. The hemi-eater could be obtained without passing through III by treating the residue obtained after saponification with alc. and Ma2CO, and cooling at -15° to -18° after decolorization to give 1.4-butanebis(monoethy) phosphonate) (IV), m. 73-3.9°. Similarly prepared were 1,2-echane bis(monoethy) phosphonate), m. 47.8-8.6°, 1,5-pentanebis(monoethy) phosphonate), m. 28.7°. A mixture of 39.06 g, buty] glycidyl ether and 60.06 g, monethyl bensylphosphoate was heated 1 hr. at 100° to give a mixed ester in the form of an oily liquid This mixed ester was fractionally distilled to give 2-bensyl-4-butoxymethyl-1,3-dioxa-2-oxophospholane). The preparation of p-xylylene-2.2°-bis(4-phenoxy-1,3-dioxa-2-oxophospholane). The preparation of p-xylylene-2.2°-bis(6-phenoxy-1,3-dioxa-2-oxophospholane). The preparation of the

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SESSION WILL BE HELD FOR 120 MINUTES STN INTERNATIONAL SESSION SUSPENDED AT 07:50:57 ON 06 SEP 2007

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ANSWER 2 OF 2 CAPLUS COPYRIGHT 2007 ACS on STN
L10
AN
     2004:589556 CAPLUS <<LOGINID::20070906>>
DN
     141:124582
ΤI
     Process for production of pentaerythritol diphosphonates
IN
     Tanabe, Seiichi; Yanagida, Takatsune; Imamura, Koichi; Tando, Kazushi;
     Taketani, Yutaka
     Teijin Chemicals Ltd., Japan
PA
SO
     PCT Int. Appl., 54 pp.
     CODEN: PIXXD2
DT
     Patent
LA
     Japanese
FAN.CNT 1
     PATENT NO.
                          KIND
                                 DATE
                                             APPLICATION NO.
                                                                      DATE
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PΙ
     WO 2004060900
                          A1
                                 20040722
                                           WO 2003-JP16754
                                                                      20031225
         W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,
             CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
             GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO,
             NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ,
             TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
         RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,
             BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE,
             ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,
             TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     AU 2003292814
                                 20040729
                                             AU 2003-292814
                          A1
                                                                      20031225
     EP 1586576
                           A1
                                 20051019
                                              EP 2003-768243
                                                                      20031225
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             IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
     CN 1735625
                           Α
                                 20060215
                                              CN 2003-80108221
                                                                      20031225
     US 2006116526
                           A1
                                 20060601
                                              US 2005-541021
                                                                      20050628 <--
PRAI JP 2003-177
                           Α
                                 20030106
     WO 2003-JP16754
                           W
                                 20031225
os
     MARPAT 141:124582
GΙ
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AB A process for production of I (Ar1, Ar2 = ary1; R3-R6 = H, ary1, hydrocarbon group) useful as flame retardants comprises reacting PCl3 with pentaerythritol in the presence of an inert solvent to form pentaerythritol dichlorophosphite, reacting pentaerythritol dichlorophosphite with an aralkyl alc. to form a pentaerythritol diphosphite halide, and heat-treating pentaerythritol diphosphite halide at 80-300°. Thus, I (Ar1, Ar2 = Ph; R3-R6 = H) with high purity was prepared in high yield.

(FILE 'HOME' ENTERED AT 16:20:34 ON 06 SEP 2007) FILE 'REGISTRY' ENTERED AT 16:20:43 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:20:54 ON 06 SEP 2007 L1STRUCTURE UPLOADED L20 S L1 L3 0 S L1 SSS FULL FILE 'STNGUIDE' ENTERED AT 16:21:30 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:23:12 ON 06 SEP 2007 STRUCTURE UPLOADED T.4 L5 0 S L4 L6 STRUCTURE UPLOADED L7 22 S L6 FILE 'STNGUIDE' ENTERED AT 16:25:46 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:27:42 ON 06 SEP 2007 L8STRUCTURE UPLOADED L9 20 S L8 FILE 'STNGUIDE' ENTERED AT 16:28:10 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:30:50 ON 06 SEP 2007 FILE 'STNGUIDE' ENTERED AT 16:31:05 ON 06 SEP 2007 FILE 'CASREACT' ENTERED AT 16:32:16 ON 06 SEP 2007 L10 STRUCTURE UPLOADED L11 12 S L10 FILE 'STNGUIDE' ENTERED AT 16:32:53 ON 06 SEP 2007 FILE 'STNGUIDE' ENTERED AT 16:35:59 ON 06 SEP 2007 FILE 'REGISTRY' ENTERED AT 16:36:01 ON 06 SEP 2007 L12 STRUCTURE UPLOADED L13 5 S L12 L14 STRUCTURE UPLOADED L15 5 S L14 L16 53 S L14 SSS FULL FILE 'CAPLUS' ENTERED AT 16:37:11 ON 06 SEP 2007 L17 175 S L16 L18 143 S L17 AND PREP/RL FILE 'STNGUIDE' ENTERED AT 16:37:27 ON 06 SEP 2007 FILE 'REGISTRY' ENTERED AT 16:39:43 ON 06 SEP 2007 L19 STRUCTURE UPLOADED L20 3 S L19 L21 46 S L19 SSS FULL FILE 'CAPLUS' ENTERED AT 16:40:04 ON 06 SEP 2007 L22 101 S L21 L23 71 S L22 AND PREP/RL L24 25 S L18 AND L23 FILE 'REGISTRY' ENTERED AT 16:40:35 ON 06 SEP 2007 FILE 'CAPLUS' ENTERED AT 16:41:03 ON 06 SEP 2007

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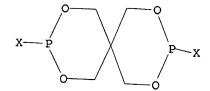
L26 24 S L24 NOT L25

FILE 'REGISTRY' ENTERED AT 16:41:37 ON 06 SEP 2007

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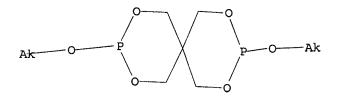
L14 HAS NO ANSWERS

L14 STR



Structure attributes must be viewed using STN Express query preparation.

=> d 119 L19 HAS NO ANSWERS L19 STR



Structure attributes must be viewed using STN Express query preparation.

10541021-intermediate

2 of 34

TZS MANSHEREN ORUZNIZ-CAPLUS COPYRIGHT-2007 ACSZONISTN 4

146:101607

novel flame retardant of spirocyclic pentaerythritol bisphosphorate for

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146,101607
A novel flame rotardant of spirocyclic pentaerythritol bisphosphorate for epoxy resins
Chen. Gui-Hong; Yang. Bing; Mang. Yu-Zhong
Center for Degradable and Flame-Retardant Polymeric Materials, College of Chesistry, Sichuan University, Chengdu, 61054, Peop. Rep. China
Journal of Applied Polymer Science (1200), 102(5), 4978-4982
CODEN: JAPNAB, ISSN: 0021-8985
John Miley & Sons. Inc.
Journal
Inglish
A novel flame retardant for epoxy resins, bisdiglycol spirocyclic
pentaerythritol bisphosphorate (BDSPBP) was prepared from the reaction of
diethylene glycol with spirocyclic pentaerythritol bisphosphorate diphosphoryl
chloride, which was obtained from the reaction of phosphoryl chloride with
pentaerythritol. Flammability of the cured epoxy resin systems consisted of
diglycidyl ether of bisphenol A (DOSBA), low-mol.-weight polyamide and BDSPBP
are investigated by vertical burning test (UL-94) and limiting oxygen index
test (LOI). The results indicate that BDSPBP has good flame retardance on
epoxy. The thermogravimetric anal. (TGA) shows that the epoxy resin
containing BDSPBP has a high yield of residual char at high temps., indicating
that BDSPBP is an effective charring agent. From the SEM observations of the
residues of the flame retardant systems burned, the compact charred layers can
be seen, which form protective shields to protect effectively internal
structure, and inhibit the transmission of heat and heat diffusion during
contacting fire.

11. CTA 3 CP.
RL: MOA (Modifier or additive use); SPN (Synthetic preparation); PREP

IT

**1:-T* 46 Pt.
RL: MOA (Modifier or additive use), SPN (Synthetic preparation); PREP 'Preparation'; USES (Uses) (preparation of (fame retardant spirocyclic pentagrythritol bisphosphorate for epoxy resins) 9:1497-86-0 CAPLUS Ethanol, 2,2'-[(1,9-dioxido-2,4,8,10-tetraoxa-3,9-diphosphagiro[5.5] undecane-3,9-diphosphagiro[5.5] undecane-3,9-diphosphagiro[5.5] undecane-3,9-diphosphagiro[5.5]

PAGE 1-B

- CH2 - CH2 - OH

IT 714-97-4

RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of flame retardant spirocyclic pentaerythritol bisphosphorate

10541021-intermediate

3 of 34

diphosphaspiro[5.5]undecane
RL: IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); RRPP (Preparation); RRCT (Reactant or reagent) (preparation of pentaerythritol diphosphites and diphosphonates) 3643-70-7 CAPLUS 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS

4.8.10-Terraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-PCI) (CA INDEX NAME)

475101-75-8 CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(2-phenylethoxy)-9CI) (CA INDEX NAME)

Ph- CH2-CH2-0---P--- O-- CH2 -- CH2 -- Ph

ANSHER 1 OF 240 CARLUST COPYRIGHT 2007 VACS ON STHE

200: 17:296 CAPLUS Full-text
141:7281
Preparation of pentaerythricol bis(phosphite)s
Yanagida, Takatsune, Ando, Shinich; Imamura, Koichi, Tanabe, Seiichi,
Tando, Kazushi; Taketani, Yutaka
Teijin Chemicais Ltd., Japan
Jpn. Kokai Tokkyo Koho, 25 pp.
CODEN: JKXXAF
Patent
Japanese
CNT 1
PATENT NO, KIND DATE APPLICATION NO. DATE PI JP 2004149443 A 200410529 PRAI JP 2002-315548 20021030 OS CASREACT 141:7281, MARPAT 141:7281 CI JP 2002-315548 20021030

for epoxy resins)
714-87-4 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-,
3,9-dioxide (CA INDEX NAME)

RE.CNT 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD ALL CITATIONS AVAILABLE IN THE RE FORMAT

L25T-ANSWERRIEOPA124Z-CAPLUSK-CORYRICHT-2007FACSKONESTN_ AN 2004:489688 CAPLUS Full-Lext

141:38738

ON 141:39738
TI Preparation of pentaerythritol diphosphites and diphosphonates
IN Yanagida, Takatsuner Ando, Shinichi, Imamura, Koichi, Tanabe, Seiichi,
Tando, Kazushi, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
50 Jpn. Kokai Tokkyo Koho, 26 pp.
CODEN: JUXXAF

DT Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE APPLICATION NO. DATE JP 2004168687 (20040617) 20021119 JP 2002-334943 20021119

PAI JP 2004168687
PRAI JP 2002-334943
OS MARPAT 141:38738
GI

The diphosphites I [X1, X2 - OZAr, Ar - C6-20 (un)substituted aryl, 2 = (un)substituted CH2, CZH4], useful as fireproofing agents, nucleating agents, plasticizers, antioxidants, etc. (no data), were prepared by reaction of pentaerythritol with Pcl3 in inert solvents and reaction of the resulted solms. or suspensions of I [X1 - X2 - Cl) with ArZOH (Ar, Z - same as above) while bubbling inert gases. Pentaerythritol diphosphonates are prepared from the diphosphites by UV irradiation or heating in the presence of halogen compds. Pentaerythritol was treated with Pcl3 in PhWs in the presence of pyridine and treated with benzyl alc. while bubbling N at room temperature for 60 min to give 90.15 I [X1 - X2 - OCK12Ph).
3443 76-7F, Pentaerythritol dichlorophosphite 7093-26-9F, 3,9-Disenzyloxy-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 475101-75-8P, 3,9-Bis(2-phenylethyloxy)-2,4,8,10-tetraoxa-3,9-

10541021-intermediate

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The title compds. I [X = OZAr; Z = (un)substituted CH2, (un)substituted C2H4; Ar = (un)substituted C6-20 aryl], useful as fireproofing agents, nucleating agents, plasticizers, antioxidants, atc., are prepared by reaction of PCI3 with pentagraphic lin inner solvents, heating the resulting solns, or suspensions of I (X = Cl) at 40-120*, and successive treatment with ArZOM (Ar, Z = same as I; M = alkali metal). Preparation of pentagrythritol bis(phosphonate)s from title compds. is also claimed. E.g., a suspension of I (X = Cl) in PhNe was treated with PhOHZONa at room temperature for 60 min to give 98.94 I (X = OCHZPh).
2443-70-79 70-219-29-39-3101-79-99, 3,9-Bis[(2-phenylethylloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane
RL: IMF (Industrial manufacture), RCT (Reactant); SPN (Synthetic preparation), PRSP (Proparation), RATT (Reactant or reagent) (preparation of pentagrythritol bis(phosphite)s with aralkyl alc. alkali metal salts)
244.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS 24.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9C1) (CA INDEX NAME)

475101-75-8 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylechoxy)-(9C1) (CA INDEX NAME)

L26 ANSWER 1 OF 24 CAPLUS COPYRIGHT 2007 ACS ON STN

DN 140:303859
TI Preparation of spiro-pentaerythritol diphosphites
IN Tando, Kazushi, Ando, Shinichi; Imamura, Koichi; Tanabe, Seiichi;
Yanagida, Takatsune; Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

APPLICATION NO. PATENT NO. KIND DATE DATE JP 2004099567 JP 2002-266624 MARPAT 140:303859 JP 2002-266624

Title spiro compds. I [X1 = Ar2Z2O; X2 = Ar3Z3O; Ar2, Ar3 = C6-20 (un)substituted aryl; Z2, Z3 = CR7R8, CR9R10CR11R12; R7, R8 = H. C6-20 (un)substituted aryl; C1-20 (un)saturated hydrocarbyl; R9-R12 = similar group as in R7, R8] are prepared by treatment of I [X1 = X2 = C1] with Ar1Z10H (Ar1 = C6-20 (un)substituted aryl; Z1 = similar group as in Z2 and Z3) in the presence of organic bases as HC1 scavengers, filtering the reaction mixts, to remove the generated salts, and washing the filtrates with aqueous alkalies. After washing, the alkali wastes are reused for washing the products. Thus, I (X1 = X2 = C1) was treated with PhCN2OH and pyridine in MePh, filtered, and the filtrate washed with aqueous NAOH to give 33% I (X1 = X2 = PhCH2O) with 95% purity. The aqueous NAOH waste was recovered and used again for washing another filtrate to give the product with same purity.

RE: IMF (Industrial manufacture), PUR (Purification or recovery); SPN
(Synthetic preparation), PRSP (Preparation)
(preparation of spiro-pentaerythritol diphosphites, their purification by

ous
alkalies, and reusing the alkali wastes)
7093-28-9 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspirol5.5]undecane, 3,9-bis(phenylmethoxy)(9CI) (CA INDEX NAME)

10541021-intermediate

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Title compds. I [Ar4, Ar5 = C6-20 (un)substituted aryl, 24, 25 = CR14R15, CR16R17CR18R19, R14, R15 = H, C6-20 (un)substituted aryl, C1-20 (un)saturated hydrocarbyl; R16-R19 = similar group as in R14, R15], useful for fireproofing agents, etc., are prepared by chlorination of pentaerythritol (III) with PC11 in the presence of inert solvents, successive treatment with Ar12ION [Ar1 = C6-20 (un)substituted aryl, 21 = similar group as in Z4, Z5] in the presence of organic bases, removal of the bases, their salts, and the solvents, and treatment of the resulting spiro-pentaerythritol diphosphites III [Ar2, Ar3 = similar group as in Z1] with R13X (R13 = alkal1 metal, C1-20 alkyl, aralkyl, aryl, etc.; X = Br, iodine) at 80-300°. The removed solvents are recovered and reused in the above process. Thus, II was chlorinated with PC13 in pyridine and xylene, condensed with PhCH20H, filtered, the filtrate washed with IN NGM, the organic phase evaporated, and refluxed with PhCH20H to give 89% I (Ar424 = Ar525 = PhCH2) with >99% purity. II was similarly reacted in recovered solvent to give the product without decline in yield or purity.

24-43-76-77, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane 7693-38-99 [R1: IMF (Industrial manufacture); RCT (Reactant); PREF (FF19parattun); RACT (Reactant or reagent) (preparation of spiro-pentaerythritol diphosphonates from pentaerythritol using recycled solvents) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

10541021-intermediate

ΙT 3-42-29 7F, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-

diphosphaspiro[5.5]undecame
RL: RCT (Reactant); SPN (Synthetic preparation); PREP
(Preparation); RACT (Reactant or reagent)
(preparation of spiro-pentaerythritol diphosphites, their purification by

alkalies, and reusing the alkali wastes)
3643-70-7 CAPLUS
2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA
INDEX NAME)

6 of 34

AN 2004:268555 CAPLUS FULL-text
DN 140:304655
The Preparation of spiro-pentaerythritol diphosphonates using recycled solvents
Tanabe. Selichi; Ando, Shinichi; Imamura, Koichi; Tando, Kazushi; Yanagida, Takatsune; Taketani, Yutaka
Tojin Chemicals Ltd. Japan
SO Jpn. Kokai Tokkyo Koho, 28 pp.
CODEN: JKXAAP

DT Patent

Patent Japanese

FAN.CNT 1 PATENT NO. KIND DATE APPLICATION NO. DATE @20040402- JP 2002-266623 JP 2004099566 20020912 PRAI JP 2002-266623 20020912

10541021-intermediate

8 of 34

GI36 PANSHER 6-0F-24 CAPLUS COPYRIGHT 2009-ACS on STN AN 2004:268536 CAPLUS Full-text

140:303854 DN TI

140:303854
Preparation of spiro-pentaerythritol diphosphites in presence of recyclable hydrogen chloride scavengers
Tando, Kazushi, Tanabe, Selichi, Taketani, Yutaka
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKKKAF

so

DT

Patent Japanese

FAN CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE €20040402 D JP 2002-262497 JP 2004099500 Α 20020909

PRAI JP 2002-262497 20020909
OS CASREACT 140:303854; MARPAT 140:303854

Title spiro compds, I [X1 = Ar2Z2O; X2 = Ar3Z3O; Ar2, Ar3 = C6-20 (un)substituted aryl; 22, 23 = CR788, CR9RBOCRIR12; R7, R8 = H, C6-20 (un)substituted aryl; C1-20 (un)substituted hydrocarbyl; R9-R12 = similar group as in R7, R8] are prepared by treatment of I (X1 = X2 = C1) with Ar1Z1OH (Ar1 = C6-20 (un)substituted aryl; Z1 = similar group as in Z2 and Z3) in the presence of organic bases with water solubility S1 weight% at 20° and 1 atom as HC1 scavengers. Thus, I (X1 = X2 = C1) was treated with PhCH2OH and PhNMe2 in MePh at 20° for 30 min to give 93% I (X1 = X2 = PhCH2O) and to recover 96% PhNMe2.

FINNEZ. 7093-28-99 RL: IMF (Industrial manu(acture); SPN (Synthetic preparation); PRSP

(Proparation)
(preparation of spiro-pentaerythritol diphosphites in presence of water-insol. tertiary amines as recyclable HCl scavengers)
7093-28-9 CAPLUS
2,4,8,10-Tectraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9Cl) (CA INDEX NAME)

3643-70-7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5.5)undecane

RL: RCT (Reactant); SPN (Synthetic preparation); PREP ,verparation; RACT (Reactant or reagent) (preparation of spiro-pentaerythritol diphosphites in presence of water-insol. tertiary amines as recyclable HCl scavengers) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

AN 2004:217191 CAPLUS Full-text

CAPLUS Full-text

140:253718
Preparation of high-purity pentaerythritol spirocyclic diphosphonates without purification of intermediates
Tanabe, Selichi; Yanagida, Takatsune; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 23 pp.
CODEN: JKXXAF
Patent

IN

Patent Japanese

FAN. CNT 1 PATENT NO.

PI JP 2004083538 A 200409719 PRAI JP 2002-194712 A 20020703 OS CASREACT 140:253718; MARPAT 140:253718

A 620040378 APPLICATION NO.

A 20020703

APPLICATION NO.

DATE

The diphosphonates I (Ar1, Ar2 = C6-20 aryl, R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts. with ArCRIR2Cr3/RAOH (Ar = C6-20 aryl, R1-R4 = same as above) in the presence of organic bases, removal of the organic bases and their salts from the reaction mixts. containing diphosphites III (Ar1, Ar2, R1-R8 = same as above), and heating the reaction mixts. in the

10541021-intermediate

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The title bis(phosphonate)s I (Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl), useful as polymer fireproofing agents, are prepared by treatment of pentaerythritol (II) with PCl3 in nonreactive solvents, treatment of the reaction mixts with ArCRIRZOH (Ar = C6-20 aryl, R1, R2 = Same as above) in the presence of organic bases, removal of the organic bases and their solts from the reaction mixts. containing diphosphites III (Ar1, Ar2, R1-R4 = same as above), and heating the reaction mixts. in the presence of RX (R = alkali metal, C1-20 alkyl, araklyl, etc; X = Br, iodide) at 80-300°.

Thus, Il was sequentially treated with PCl3 in xylene and with PhCH2ON in the presence of pyridine, filtered, and the filtrate was washed with aqueous NAOH solution and then heated in the presence of PhCH2Br at 130° to give 90.6% I (R1-R4 = H, Ar1 = Ar2 = PH) with purity 99.1%.

'41 10 74°, 3,9-Dichloro-2.4,8,10-tetraoxa-3.9-diphosphaspiro[5.5] undecane 7093-25-7P

RIL IMF (Industrial manufacture), RCT (Reactant), SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

ΙT

polymer fireproofing agents without purification of intermediates) 3643-70-7 CAPLUS 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

7093-28-9 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

- 0- CH2 - Ph

CIMETANSHER OF 14 CAPLUS COPYRIGHT 2007-ACSCOMETN

2004:97533 CAPLUS Full-text 140:146290

10541021-intermediate

475101-75-8 CAPLUS 2.4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-bis(2-phenylethoxy)-(CA INDEX NAME)

L26 JANSMER 350P 24 CAPLUS COPYRIG AN 2004: 217190 CAPLUS FULL-TEXT COPYRIGHT 1200 7 ACS ON STN

2004:217190 CAPLUS Full-text
140:233717
Preparation of high-purity pentaerythritol spirocyclic bis(phosphonate)s without purification of intermediates
Tanabe, Selicihi, Yanagida, Takatsune, Tando, Kazushi, Imamura, Koichi, Ando, Shinichi, Taketani, Yutaka
Teijin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 24 pp.
CODEN: JKXXAF

PA SO

Patent DT Japanese

PAN. CNT 1

PATENT NO. KIND DATE APPLICATION NO. DATE 200203185 JP 2002-263847 20020703 PI JP 2004083537 A (60403183)
PRAI JP 2002-194711 A 20020703
OS CASREACT 140:253717; MARPAT 140:253717 20020910

12 of 34

Ilou-intermediate Ilou intermediate Ilou intermediate preparation of pentaerythritol spirocyclic diphosphites from their corresponding dichlorophosphite Tando, Kazushi, Tanabe, Seiichi, Taketani, Yutaka Teijin Chemicala Etd. Japan Jpn. Kokai Tokkyo Koho, 12 pp. CODEN: JKXXAF Patent Japanese CRT 1

DATE

20020703

NT 1 PATENT NO.

KIND DATE APPLICATION NO. A 620040206 JP 2002-194713 PI JP 2004035465 PRAI JP 2002-194713

CASREACT 140:146290; MARPAT 140:146290

The title diphosphites I (X = OCRIR2Ar1; Y = OCRIR4Ar2; Ar1, Ar2 = C6-20 ary1; R1-R4 = H, C6-20 ary1, C1-20 hydrocarby1) are prepared by treatment of I (X, Y = C1) with ArCRIR2OH (Ar = C6-20 ary1) R1, R2 = same as above) in the presence of organic bases as HCl scavengers, filtration of the resulting organic HCl salts, and washing of the filtrates with alkaline solns, wherein organic bases are recovered from the resulting alkaline waste solns. Thus, pentaerythritol was treated with PC11 in the presence of NRt3 and substituted with PhC18OH in the presence of NRt3 to give 95% I (X = Y = OCM2Ph), which was filtered and the filtrate was washed with 1 N aqueous NaOH solution and water. NaOH pellets were added to the waste aqueous NaOH solution, filtered, and distilled to recover 95% NRt3 with purity of 95%.

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP

reparation; (recovery of organic base HCl scavengers from waste alkaline solns. in environmentally friendly preparation of pentaerythritol spirocyclic diphosphite by substitution of the corresponding bis(chlorophosphite) with aralkyl alcs.) 89-28-9 CAPLUS

2,4,6,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

3643-70-7P RL: RCT (Reactant); SPN (Synthetic preparation); PREP

10541021-intermediate

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Properation; RACT (Reactant or reagent)
(recovery of organic base HCl scavengers from waste alkaline soins, in
environmentally friendly preparation of pentaerythritol spirocyclic
diphosphite by substitution of the corresponding bis(chlorophosphite)
with aralkyl alcs.)
3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA

AN 2004:92255 CAPLUS FUTT-LEXT

2004*79255 CAPLUS Full-text
140:14629
Environmentally friendly preparation of pentaerythritol apirocyclic diphosphites from their corresponding dichlorophosphite Tando, Kazushi; Tanabe, Selichi; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAP

APPLICATION NO.

JP 2002-194716

DATE

20020703

KIND DATE

Α...

Patent Japanese

FAN.CNT 1 PATENT NO.

P1 JP 2004035468 A 20040203 PRAI JP 2002-194716 20020703 OS CASREACT 140:146289; MARPAT 140:146289

The title diphosphites 1 (X = OCR3R4CR1R2Ar1, Y = OCR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl; R1-R4 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by treatment of 1 (X, Y = C1) with ArCR1R2CR3R4OH (Ar = C6-20 aryl; R1-R4 = Same as above) in the presence of organic bases as RC1 scavengers, fitration of the resulting organic RC1 salts, and washing of the filtrates with alkaline solns. wherein organic bases are recovered from the resulting alkaline waste solns. Thus, pentaerythricol was treated with PC13 in the presence of NEt3 and substituted with PhCH2CH2OH in the presence of NEt3 to give 951 1 (X = Y = OCH2CH2CH), which was filtered and the filtrate was washe with 1 N aqueous NsOH solution and water. NsOH pellets were added to the

10541021-intermediate

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The title diphosphites I (X = OCRIR2Ar1; Y = OCRJR4Ar2; Ar1, Ar2 = C6-20 ary1; R1-R4 = H, C6-20 ary1, C1-20 hydrocarby1) are prepared by heating solns. or suspensions of I (X, Y = C1; manufactured from pentaerythritol and Pcl3) at 40-120° under an inert atmospheric, followed by treatenent with ArcRIR2OM (Ar - C6-20 ary1; R1, R2 = same as above) in the presence of organic bases as HCl scavengers. Thus, 20.1 mmol pentaerythritol (Pentarit S) was treated with 41.8 mmol Pcl3 in the presence of 1.0 mmol pyridine in toluene under a N atmospheric to give a suspension, which was heated at 80°, cooled, treated with 40.3 mmol PhCH2OM in the presence of 42.5 mmol pyridine to give I (X = Y = OCH2Ph) with selectivity 93.5%.
70:37-16-51, 3,9-Bis[(phenylmethyl)oxy]-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREF

(preparation of pentaerythritol spirocyclic diphosphites by heating solns. or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs, in the presence of organic base HCl

scavengers)
7093-28-9 CAPLUS
24.4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9CI) (CA INDEX NAME)

647807-03-2 CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(1-phenylethoxy)-9CI) (CA INDEX NAME) (9CI)

8643-70-96, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: RCT (Reactant); SPN (Synthetic preparation); PREF

10541021-intermediate

14 of 34

waste aqueous NaOH solution, filtered, and distilled to recover 95% NEt3 with purity of 95%. waste aquessor
purity of 95%,
475101-75-KP
RL: IMP (Industrial manufacture); SPN (Synthetic preparation); PR3P

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)
(recovery of organic base RCI scavengers from waste alkaline soins, in environmentally friendly preparation of pentaerythricol spirocyclic diphosphite by substitution of the corresponding bis(chlorophosphite) with aralkyl ales.
475101-75-8 CAPUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

36:1)-70-TP
RL: RCT (Reactant); SPN (Synthetic preparation); PRSP
(Proparation:, RACT (Reactant or reagent)
(recovery of organic base HCl scavengers from waste alkaline solns. in
environmentally friendly preparation of pentaerythritol spirocyclic
diphosphite by substitution of the corresponding bis(chlorophosphite)
with aralkyl alcs.)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA
INDEX NAME)

140:111531
Preparation of high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate Tando, Kazushi, Tanabe, Seiichi, Yanagida, Takatsune, Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 12 pp. CODEM: JKXXAP

DT Patent LA Japanese FAN, CNT 1

APPLICATION NO. PATENT NO. KIND DATE DATE PI JP 2004018406 A 40040122)
PRAI JP 2002-172653 20020613
OS CASREACT 140:111531; NARPAT 140:111531 G20040L227) JP 2002-172653 20020613

10541021-intermediate

(Preparation), RACT (Reactant or reagent)
(preparation of pentaerythritol spirocyclic diphosphites by heating solns or suspensions of the corresponding dichloride under an inert atmospheric

and substitution with aralkyl alcs, in the presence of organic base HCl

Scavengers)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CAINDEX NAME)

CL26TJANSWER 12 OF 24 CAPLUS COPYRIGHT 2007 ACS OR STN
AN 2004:57503 CAPLUS FULL CEXT

140:111530
Preparation of storage-stable and high-purity pentaerythritol spirocyclic bis (phosphite) s

Yanagida, Takatsune; Tanabe, Selichi; Tando, Kazushi; Taketani, Yutaka Teijin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 14 pp. CODEN: JXXXAF

PA SO

DT

DT Patent LA Japanese FAN.CNT 1

PATENT NO. PI JP 2004018388 PRAI JP 2002-171214 OS CASREACT 140 KIND DATE APPLICATION NO. DATE A (20040)220 JP 2002-171214 20020612 CASREACT 140:111530; MARPAT 140:111530

The title bis(phosphite)s I (X = OCRIR2ArI, Y = OCRIR4Ar2, Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by substitution of I (X, Y = Cl) with ArcR182OH (Ar = C6-20 aryl, R1, R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° at normal pressure under an inert atmospheric Thus, I (X = Y = Cl) was treated with 200 mol8 PhCH2OH in the presence of 200 mol8 pyridine in toluene under a dry N atmospheric and filtered to remove pyridine-HCl salt, and the filtrate was washed with 0.5 N NoOH solution and water, dried, and concentrated to give 95% I (X = Y = OCR2Ph) with purity 95% and purity retention 100% after storage under dry N for 2 wk.

7/03-32-9 CAPLUS

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7093-28-9 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(CA INDEX NAME)

India 1977 PREP AID (Synthetic preparation); PREP 1975 PREP 197

ANSWER DEVOPE 24 MCAPLUS COPYRIGHT 22007 TACSFOR STN

ANSWERFERENCOPS24***CAPLUS COPYRIGHT*2002**ACSFOR**STN

2004:55607 CAPLUS PUll-text
140:111529
Preparation of storage-stable and high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate vanagida. Takatsuns: Tanabe, Selichi; Tando, Kazushi; Imamura, Koichi; Ando, Shinichi; Takatani, Yutaka
Teijin Chemicals Lid. Japan
Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JKXAF
Patent
Japanese
CNT 1
PATEUR ...

PATENT NO. KIND DATE APPLICATION NO. DATE PI JP 2004018410 A 20055772230
PRAI JP 2002-172657 20020613
OS CASREACT 140:111529, MARPAT 140:111529
GI A 62004 07722233 JP 2002-172657 20020613 20020613

10541021-intermediate

19 of 34

GLEGGAMERENIA OPTE CAPLUS COPYRIGHT 2007 ACS ON STN

140:111528

Preparation of storage-stable and high-purity pentaerythritol spirocyclic

Preparation of Storage-Stable and high-purity pentaerythritol spire bis(phosphite)s Tando, Kazushi; Tanabe, Seiichi; Imamura, Koichi; Taketani, Yutaka Teijin Chemicala Ltd., Japan Jpn. Kokai Tokkyo Koho, 14 pp. CODEN: JKXXAF Patent

DT Patent
LA Japanese
FAN.CNT 1
PATENT NO. APPLICATION NO. KIND DATE APPLICATION NO.

A (20110122 JP 2002-172652 P1 JP 2004018405 PRAI JP 2002-172652 OS CASREACT 100 DATE 20020613

JP 2002-172652 20020613 CASREACT 140:111528; MARPAT 140:111528

The title bis(phosphite)s I (X = OCR3R4CR1R2AT1; Y = OCR5R6CR7R8AT2; AT1, AT2 = C6-20 aryl; R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by substitution of I (X, Y = Cl) with ArCR1R2CR3R40H (Ar = C6-20 aryl; R1-R4 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° at normal pressure under an inert atmospheric Thus, I (X = Y = Cl) wast treated with 200 mol* PhCHCAZOH in the presence of 200 mol* pyridine in toluene under dry N atmospheric and filtered to remove pyridine-HCl salt, and the filtrate was washed with 0.5 N NaON solution and water, dried, and concentrated to give 95% I (X = Y = OCH2Ph) with purity 94% and purity retention 100% after storage in dry N for 2 wk.

175101-75-87

RIL IMF (Industrial manufactural) PID (Puriffering or account) 2000

475101-75-09.
RL: IMP (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation) (preparation of pentaerythrical spirocyclic bis(phosphite)s by substitution of the corresponding dichloride with aralkyl alcs. in the presence of organic base HCl seavengers under an inert atmospheric) 475101-75-8 CAPUS 2.4.8.10-TBCTROKAS.9-diphosphaspiro[5.5]undecane, 3.9-bis(2-phenylethoxy)-19C1) (CA INDEX NAME)

10541021-intermediate

The title diphosphites I (X = OCR3R4CR1R2Ar1; Y = OCR5R6CR7R8Ar2; Ar1, Ar2 = C6-20 aryl; R1-R8 = H, C6-20 aryl, C7-30 aralkyl, C1-20 hydrocarbyl) are prepared by heating solms, or suspensions of I (X, Y = C1; manufactured from pentaerythritol and PC13) at 40-120° under an inert atmospheric, followed by treatment with ArCR1R2CR3R4OH (Ar = C6-20 aryl; R1, R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° in inert atmospheric Thus, 200.5 mmol pentaerythritol was treated with 417.6 mmol PC13 in the presence of 9.9 mmol pyridine (II) in toluene under a N atmospheric to give a suspension, which was heated at 80°, cooled, treated with 401.1 mmol Ph(CH2)20H in the presence of 425.4 mmol II at 20°, and filtered to remove II-HCl salt, and the filtrate was washed with 0.5 N NaOH solution and water, dried, and condensed to give 944 I (X = Y = O(CH2)2Ph) with purity 978 and purity retention 100% after storage in dry N for 2 w. 475.10 '5-80', 3,9-81s[(2-phenylethyl)oxyl-2.4.8,10-tetraoxa-3,9-diphosphaspiro(5.5) jundecane
RL: IMF (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation) (preparation of pentaerythritol spirocyclic diphosphites by heating solms. or suspensions of the corresponding dichloride under an inert atmospheric

18 of 34

substitution with aralkyl alcs. in the presence of organic base HCl

SCAVENGERS)
475101-75-8 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

3643-70-7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9diphosphaspiro[5,5]undecane
RL: IMP (Industrial manufacture), RCT (Reactant), SPN (Synthetic
preparation) PREP (Preparation), RACT (Reactant or reagent)
(preparation of pentaerythritol spirocyclic diphosphites by heating solns,
or suspensions of the corresponding dichloride under an inert atmospheric

and

substitution with aralkyl alcs. in the presence of organic base HCl scavengers) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

10541021-intermediate

20 of 34

3643-70-70

2442*70-70
RE: RCT (Reactant); SPN (Synthetic preparation); PRSP
(Preparation); RACT (Reactant or reagent)
(preparation of pentaerythritol spirocyclic bis(phosphite)s by substitution of the corresponding dichloride with aralkyl alcs. in the presence of organic base HCl scavengers under an inert atmospheric)
3643-70-7 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5,5]undecane, 3,9-dichloro- (CA

2,4,8,10-Tetraoxa-3,9-diphosphaspiro{5,5}undecane, 3,9-dichloro- (CA

CU2612ANSHER 15-09-24-1CADLUST-COPYRIGHT;2007-ACS-on-STN AN 2004:52790 CAPLUS <u>Pull-text</u> DN 140:111525

140:111525
Preparation of high-purity and storage-stable pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate
Tanabe, Seiichi, Yanagida, Takatsune; Tando, Kazushi, Imamura, Koichi, Ando, Shinichi, Taketani, Yutaka
Teljin Chemicals Ltd., Japan
Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXAFF
PAtent
Japanese
CNT 1

IN

рτ

KIND DATE APPLICATION NO.

A 20040122 JP 2002-172656 PATENT NO. JP 2004018409 A 20040122 JP 2002-172656 20020613 CASREACT 140:111525; MARPAT 140:111525

The title diphosphites I (X = OCR1R2Ar1, Y = OCR3R4Ar2, Ar1, Ar2 = C6-20 aryl, R1-R4 = H, C6-20 aryl, C1-20 hydrocarbyl) are prepared by heating solms, or suspensions of I (X, Y = C1) manufactured from pentaerythricol and PC13) at 40-120° under an inert atmospheric, followed by treatment with ArCR1R2OH (Ar =

1021-intermediate 21 of 34

C6-20 aryl, R1, R2 = same as above) in the presence of organic bases as HCl scavengers from -20 to 100° under inert atmospheric Thus, 201. mmol pentaerythritol was treated with 412.2 mmol Pc11 in the presence of 10.0 mmol pyridine (II) in toluene under a N atmospheric to give a suspension, which was heated at 60°, cooled, treated with 401.0 mmol PhcH20H in the presence of 425.5 mmol II at 15-20°, and filtered to remove II-HCl salt, and the filtrate was washed with 0.5 N NaOH solution and water, dried, and condensed to give 95% I (X • Y OCH2Ph) with purity 97% and purity retention 100% after storage in dry N for 2 wk. 7003-35-99, 3,9-Bis[(phenylmethyl)oxyl-2,4,8,10-tetraoxa-3,9-diphosphaspixo[5.5]undecane 647307-03-21, 3,9-Bis[(1)-phenylethyl)oxyl-2,4,8,10-tetraoxa-3,9-diphosphaspixo[5.5]undecane RL. IMF (Industrial manufacture); PUR (Purification or recovery); SPN (Synthetic preparation); PHEF (Psiparation) (preparation of pentaerythritol spirocyclic diphosphites by heating solns, or suspensions of the corresponding dichloride under an inert atmospheric

IT

and

substitution with aralkyl alcs. in the presence of organic base HCl scavengers) 7093-28-9 CAPLUS

4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(CA INDEX NAME)

647807-03-2 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro{5.5}undecane, 3,9-bis(1-phenylethoxy)-(CA INDEX NAME)

1843-70 7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9diphosphaspiro[5.5]undecane
RL: IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP (Frequestion; RACT (Reactant or reagent) (preparation of pentaerythritol spirocyclic diphosphites by heating solns or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers)
32,4,8,10-Tecraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CAINDEX NAME)

10541021-intermediate

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(preparation of dichlorotetraoxadiphosphaspiroundecane having good

(preparation of dichlorotetraoxadiphosphaspiroundecane having good stability
as intermediate for phosphite antioxidants by treatment of PCl3 with pentaerythritol and then heating)
RN 7093-28-9 CAPLUS
CN 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(phenylmethoxy)-(9Cl) (CA INDEX NAME)

ANSWER UP OF 24 CAPTUS GORYRIGHT 2007 ACS on STN 2004752788 CAPTUS Pull-text 140:11523 Preparation of high-purity pentaerythritol spirocyclic diphosphites without isolation of dichloride intermediate Yanagida, Takatsune; Tanabe, Seiichi; Tando, Kazushi; Taketani, Yutaka Teljin Chemicals Ltd., Japan Jpn. Kokai Tokkyo Koho, 11 pp. CODEN: JKXXAF

so

Patent Japanese .CNT 1 DT LA

PATENT NO.

KIND DATE APPLICATION NO.

A 20040122 JP 2002-172654 20020513 APPLICATION NO. DATE PI JP 2004018407 PRAI JP 2002-172654 20020613

CASREACT 140:111523; MARPAT 140:111523

10541021-intermediate

22 of 34

126 ANSHER 16 OF 24 GARRUS GOFFRIGHT 2007 ACS OR STN AN 2004:52789 CAPLUS <u>Full-rext</u> DN 140:111524

DN 140:111524
TI Preparation of 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane having good stability as intermediate for phosphite antioxidant for resins
IN Tando, Kazushi, Tanabe, Selichi, Taketani, Yutaka
PA Teijin Chemicals Ltd., Japan
S Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXAF
DP Patent
LA Japanese
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE

APPLICATION NO. KIND DATE JP 2002-172655 PI JP 2004018408 PRAI JP 2002-172655 20040022 20020613

CASREACT 140:111524

CASRRACT 140:111524

3,9-Dichloro-2,4,8.10-tetraoxa-3,9-diphosphaspiro[5.5] undecane (I) is prepared by treatment of PcI3 (II) with pentaerythritol (III) in organic solvents, heating the resulting solns, or suspensions at 40:120° under an inert atmospheric without isolation of I, and cooling. Thus, 42.0 mmol II was treated with 20.2 mmol III (Pentarit 8) in the presence of pyridine in toluene under N, heated at 60°, and cooled to give a suspension containing I with selectivity 96.5%. Then, pyridine and PhCM2OH were added to the suspension to give 3,9-bis(phenylmethyloxy)-2,4,8.10-tetraoxa-1,9-diphosphaspiro[5.5] undecane with selectivity 94.3%. 3613-3c-7, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane
RI, IMP (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREF (Preparation); RACT (Reactant or reagent) (preparation of dichlorotetraoxadiphosphaspiroundecane having good lity

(preparation of dichlorotetraoxadiphosphaspiroundecane having good stability as intermediate for phosphite antioxidants by treatment of PCl3 with pentaerychritol and then heating)

RN 3643-70-7 CAPLUS

CN 2,4.8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

(Preparation)

%693-28-9F, 3,9-Bis(phenylmethyloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: IMF (Industrial manufacture), SPN (Synthetic preparation), FREF

24 of 34 RL: IMP (Industrial manufacture); SPN (Synthetic preparation); PREP

10541021-intermediate

reparation; (preparation of pentaerythritol spirocyclic diphosphites by heating solns, or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers) 475101-75-8

CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-phenylethoxy)-(9CI) (CA INDEX NAME)

2643 70 7P, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5,5]undecane RL: RCT (Reactant): SPN (Synthetic preparation); [FEF *Freparation!; RACT (Reactant or reagent) (preparation of pentaerythritol spirocyclic diphosphites by heating solns, or suspensions of the corresponding dichloride under an inert atmospheric

substitution with aralkyl alcs. in the presence of organic base HCl

scavengers) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA

H<u>26 ANSWER NO OF 24 CADUUS CODYREGHE 2007 ACS ON BUN</u> AN 1994:657137 CAPLUS <u>Pull-text</u>

121:257137

Carbohydrate-substituted 2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane

stabilizers Stabilizers
Babiarz, Joseph E.; Pastor, Stephen D.
Ciba-Geigy Corp., USA
U.S., 10 pp.
CODEN: USXXAM

PA SO

DT Patent LA English FAN.CNT 1 DТ

PATENT NO PI US 5310891
PRAI US 1992-918326
OS MARPAT 121:277
GI KIND DATE APPLICATION NO. DATE 19940510 US 1992-918326 19920722 19920722

MARPAT 121:257137

The stabilizers have the structure I (0 = carbohydrate residue). A solution of 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane in PhMe was treated dropwise with 1,2:5,6-di-0-isopropylidene-0-glucose and Bt3N to give a 1. Profax \$501 containing Ca stearate 0.075, pentaerythricol tetrakis(3,5-ditetr-buty)-4-hydroxyhydrocinnamate) 0.075, and the I 0.075% showed melt flow rate 2.5 (4.3) g/10 min after I (5) extrusion cycles at 274* with 90 s residence time, compared with 4.4 (10.7) g/10 min when the I was omitted. 15%60x-45-%P.
RL: PREP (Frepatation)
(preparation of, as heat stabilizer for polypropylene)
158808-45-8 CARUS

diphosphaspiro[5.5]undecane-3,9-diyl}bis[1,2:3,4-bis-0-(1-methylethylidene)- (9CI) (CA INDEX NAME)

- 3642-70-7, 3,9-Dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane RL: RCT (Reactant); RACT (Reactant or reagent) (reaction of, with carbohydrates) 3643-70-7 CAPLUS IT

- 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5,5]undecane, 3,9-dichloro- (CA

10541021-intermediate

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CN 2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro- (CA INDEX NAME)

AN 1979:7681 CAPLUS FULL BALL COPYRIGHT 2007 ACS-ON-6TH-

1979:76

- 90:7681
 fntumescent fire retardant compositions containing pentaerythritol cyclic diphosphates
 Albright, James A.
 Velsicol Chemical Corp., USA
 U.S., 6 pp. Cont.-in-part of U.S. 3.978,167.
 CODEN: USAXAM

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4099975	A	19780711	US 1976-650282	19760119
	US 3978167	A	19760831	US 1975-616935	19750926
PRAI	US 1974-429607	A2	19740102		
	US 1975-616935	A2	19750926		

- Pentaerythritol cyclic diphosphates (I, R = haloalkoxy, diethylamino) were prepared as intumescent agents for coatings. Thus, 30 g diethylamine [109-89-7] in 50 mL C6H6 was added to 29.7 g 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dioxide [1:1-6-7-4] in 250 mL C6H6, refluxed 3 h and worked up to give 3,9-bis(N,N-diethylamino)-2,4,8,10-tetraoxa-3,9-diphosphaspiro(5,5)undecane-3,9-dioxide (I, R = diethylamino) [61090-87-7] m. 189.5-190.5°. An intumescent paint was prepared by mixing com. semi-gloss latex paint 75, chlorinated paraffin wax 5, I (R = diethylamino) 75 and water 10 g. historian-a.
 RL: USSS (Uses) (Uses) (intumescent agents, for coatings)
- 1 T

- (intumescent agents, for coatings)
 (1090-88-8 CAPLUS
 2.4,8.10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis(3-chloro-2,2-dimethylpropoxy)-, 3,9-dioxide (SCI) (CA INDEX NAME)

10541021-intermediate

L26 ANSWER 19 OF 24 CAPLUS COPYRIGHT 2007 ACS ON SIN

**NSMER 19 00 44 CAPTUS COPYRIGHT 2007 ACS on SIN 1 1986:498557 CAPTUS Full-text
105:98557

Derivatives of alkyl-substituted 4-hydroxy-methylpiperidine and their use as stabilizers
Disattists, Piero, Nucida, Gilberto
Ausimont 3.p.A., Italy
Eur. Pat. Appl., 51 pp.
CODEN: EPXXDM
Patent

Patent

English

FAN.	CNT 1			
	PATENT NO.	KIND DATE	APPLICATION NO.	DATE
PI	EP 163245	A2 19851204	EP 1985-106231	19850521
	EP 163245	A3 19861105		
	EP 163245	B1 19910731		
	R: BE, CH, DE,	FR, GB, LI, NL		
	CA 1264743	A1 19900123	CA 1985-481955	19850521
	JP 61056164	A 19860320	JP 1985-108488	19850522
	US 4772708	A 19880920	US 1987-28039	19870320
PRAI	IT 1984-21034	A 19840522		

US 47/2708 A 1986922 US 1987-28039 1997/320
US 1995-736328 A1 19850522
US 1995-736328 A1 19850522
WARPAT 105:98557
Alkyl-substituted hydroxymethylpiperidine derivs. are useful as heat, light, and oxidation stabilizers for plastics. Thus, 2,2,6,6-tetramethyl-4-hydroxymethyl piperidine, prepared by hydrogenation of 2,2,6,6-tetramethyl-4-spiroxytane, was transesterified with Me adipate, giving bis(2,2,6,6-tetramethyl)-4-methylpiperidine adipate (1). Polypropylene, stabilized by 0.5% I, had embrittlement time 3800 h, vs. 100 without I. 10.3928-44-5P
RL: PREP : Preparation:
 (preparation of, as stabilizer for polymers)
103928-44-5 CAPLUS
Piperidine, 4,4-(2,4,8,10-tetraoxe-3,9-diphosphaspiro[5.5]undecane-3,9-diphosymethylene)|bis(2,2,6,6-tetramethyl- (9CI) (CA INDEX NAME)

IT

IT

RL: RCT (Reactant), RACT (Reactant or reagent) (reaction of, with hydroxymethylpiperidine compds.) 3643-70-7 CAPLUS

10541021-intermediate

28 of 34

714-07-4
RL: RCT (Reactant); RACT (Reactant or reagent)
(reaction of, with dibromopropanol or diethylamine)
714-87-4 CAPLUS
2.4.8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-,
3,9-dioxide (CA INDEX NAME)

ANSWERTANCE 24 TOADIUS COPYRIGHT 2000 ACS ON STN,
AN 1977:17625 CAPLUS Full-text
DN 86:17625
TI Pentaerythritol cyclic diphosphates and diphosphoramidates
IN Albright, James A.
PA Michigan Chemical Corp., USA
OU.S., 8 pp.
CODEN: USXXAM
DT Patent

DT LA Patent English

FAN.	CNT 4				
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 3978167	A	19760831	US 1975-616935	19750926
	GB 1517651	A	19780712	GB 1976-1214	19760113
	GB 1517652	A	19780712	GB 1977-45795	19760113
	CA 1075257	A1	19800408	CA 1976-243559	19760113
	DE 2601278	A1	19770331	DE 1976-2601278	19760115
	DE 2601278	C3	19790503		
	US 4099975	Α	19780711	US 1976-650282	19760119
	FR 2325655	A1	19770422	PR 1976-1611	19760121
	JP 52042891	A	19770404	JP 1976-9187	19760130
	JP 57056916	В	19821202		
PRAI	US 1974-429607	A2	19740102		

Organophosphorus compds. of the formula I, where X and X' • O or S and Y and Y' • monovalent halogenated oxyaliph. or oxyalicyclic or -NRR', where R and R' • H, monovalent hydrocarbon, or halogenated monovalent hydrocarbon, were useful as flame retardants for polymers. Thus, 3,9-4/cichloro-2,4,8,10-tetraoxa-3,9-4iphosphaspiro[5.5] undecane-3,9-4ioxide [714-87-4] 29.7, 2,3-dibromopropanol [96-13-9] 43.6, and MgO olly were mixed together, heated 2 hr at 110° to drive off HCl, and cooled to room temperature to give a viscous product which was washed with NH4OH at 60° and then with H2O and dried under a vacuum. The light brown viscous product was 3,9-big(2,3-dibromopropoxy)-2,4,8,10-tetraoxa-3,9- diphosphaspiro[5.5] undecane-3,9-dioxide [61090-85-5]. IT

Atmy6-88-89 RL: PREP (Preparation)

(preparation and flame retardant properties of)
61090-88-8 CAPLUS
2,4,8,10-Tecraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(3-chloro-2,2-dimethylpropoxy)-, 3,9-dioxide (9CI) (CA INDEX NAME)

ΙT

714-37 4
RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, with alcohols or amines)
714-87-4 CAPLUS

714-87-4 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-, (CA INDEX NAME)

ANSWER 72 OF 24 CAPBUSETCOPARIGHT 2003 ACS ON STN

1976:561241 CAPLUS Full-text 85:161241

Polycyclic phosphate esters Batorewicz, Madim Uniroyal, Inc., USA U.S., 7 pp.

10541021-intermediate

ANSMER. 23-07-24—CAPRUS GOPYRIGHT 2007 AGS ONVSIN

AN 1963:475330 CAPLUS FULL-text

DN 59:75330

ORF 59:1995h, 13986a-d

TI Some chemical reactions of 3,9-dichloro-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5] undecane 3,9-dioxide

AU Raetz, Rudi F. M.; Sweeting, Orville J.

CS Olin Mathieson Chem. Corp., New Haven, CT

O Journal of Organic Chemistry (1963), 28(6), 1608-12

CODEN: JOCEAH; ISSN: 0022-3263

DT Journal

Journa l

Unavailable

Journal
Unavailable
Por diagram(s), see printed CA Issue.
Pentaerythritol (I) is treated with POCl3 to give 3,9-dichloroPentaerythritol (I) is treated with POCl3 to give 3,9-dichloro2,4.8.]Ototraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide (II) which is
converted to an adduct with HCOKNMe2. II is treated with H2O and diols to give
3,9-dihydroxy-2,4.8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide
(III). Thus, a mixture of 272.3 g. I and 660 g. POCl3 is heated 2 hrs. at 90and 20 hrs. at 100°, the solid product mixed with 500 g. POCl3, the mixture
refluxed 2 hrs., the excess POCl3 decanted, and the product heated at 120°/10
mm. The solid is washed 4 times with 200 ml. CCl4 and with 450 ml. ccld
absolute EtOH to give 478 g. II, m. 233-5° (HOAC). A solution of 1 g. II in
10 ml. anhydrous HcONNe2 is refluxed 20 ml. and kept at room temperature, and
excess HCOKNe2 is distilled after 3 days to give 1.2 g. IV, \lambda 6.0 ml. cl
anhydrous HcONNe2 is refluxed 20 ml. and kept at room temperature, and
excess HCOKNe2 is distilled after 3 days to give 1.2 g. IV, \lambda 6.0 ml. cl
anhydrous HcONNe2 is refluxed 40 ml. anhydrous HcONNe2, 5.75
g. HO(CH2)40H is added, and the mixture is refluxed 40 mln. to give 19.0 g.
monodimethylammonium salt, m. 26° (HO(CH2)40H), 97.4 yield, of III. A
mixture of 17.8 g. II and 5.4 g. HO(CH2)40H is heated 1 hr. at 110° and 3
hrs. at 145°, and the mixture distilled at 145°/1e mm. to give an oil and a
residue, and the residue is extracted with hot EtOH to give an insol. solid.
The solid is treated with 50 ml. cold H20 and H20 is evaporated to dryness
to give a total of 8.3 g. III, m. 306-7*(HOAC), 53.24 yield. The treatment of
5,94 g. II with 2.88 g. 1,4-bis(hydroxymethyl)cyclobeane at 15° also gives
III. Crude III monodimethylammonium salt (2.2 g.) is dissolved in 25 ml. H20
and the solution is poured over a Dowex-50-Mx-8 column to give 99.8* III. m.
314* (HOAC). III (1.0 g.) is suspended in 4 g. HO(CH2)40H, the mixture is
heated at 160° as a tetrahydrofuran-H20 azectrope dis

(Derived from data in the 7th Collective Formula Index (1962-1966)) 96732-42-2 CAPLUS

(Hydroxymethylene)dimethylammonium chloride, phosphate, cyclic diester with pentaerythritol (7CI) (CA INDEX NAME)

IT 714-87-4P, Pentaerythritol, cyclic diphosphorochloridate RL: PREP (Preparation)

(preparation of)

2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-dichloro-,

10541021-intermediate

CODEN: USXXAM

FAN. CNT

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PΙ	US 3970726	A	19760720	US 1975-543289	19750123
	ZA 7507361	A	19761124	ZA 1975-7361	19751124
	AU 7587073	A	19770602	AU 1975-87073	19751128
	AU 499115	B2	19790405		
	DE 2559371	A1	19760729	DE 1975-2559371	19751231
	FR 2298553	A1	19760820	FR 1976-1585	19760121
	FR 2298553	B1	19790309		
	JP 51098224	A	19760830	JP 1976-5527	19760122
	PL 105884	81	19791130	PL 1976-186703	19760122
	NL 7600743	A	19760727	NL 1976-743	19760123
	US 4054543	A	19771018	US 1976-663173	19760302
DDAT	110 1075 543300		10750111		

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VS 1975-543289 A 19750123

Fireproofing agents for polyurethane precursors to be foamed were made by reacting PCl3 with pentaerythritol [115-77-5] and either oxidizing-esterilying the product, or treating it with ethylene oxide [75-21-8] and chlorinating the product. Thus, the spiroadduct [3-43-74-7] of pentaerythritol and PCl3 was oxidized and esterified with EtoH to give the Et ester. The latter was mixed with 1-(aminoethyl)piperazine-propylene oxide adduct, methylenebis(phenyl isocyanate), surfactants, curing agent, and blowing agents to give a polyurethane with 0 index 24.5, in contrast with the value of 20.6 when no fireproofing agents was used.

40665-72-2P

GOMENT-77-2P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP
(Proparation:; RACT (Reactant or reagent)
(preparation and esterification of)
60860-22-2 CAPLUS
2,4,8,10-Tetraoxa-3,9-diphosphaspiro(5.5)undecane, 3,9-bis(2-chloroethoxy)(CA INDEX NAME)

3943-70-7P RL: RCT (Reactant); SPN (Synthetic preparation); FREE (Preparation); RACT (Reactant or reagent) (preparation and reactions of) 3643-70-7 CAPLUS

2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro- (CA INDEX NAME)

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3,9-dioxide (CA INDEX NAME)

CUZS ANSMER 24-OF 24 DECADUUS CORVEIGHTE 2000 VAGS, ON SUN. AN 1963 182866 CAPLUS FUIT-LEXE AN 1963782366 CAPLUS FUTT-CEXT N 58:22566 OREF 58:14223g-h, 14224a-b TI Pentaerythritol phosphates for use as plasticizers PA Agfa A.-G. SO 5 pp. TP Patent Unavailable

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PΙ	GB 922251		19630327	GB 1960-39545	19601117
	DE 1155901			DE	
	US 3090799		19630521	US 1960-69289	19601115
PRAI	DE		19591117		

US 1960-799 1960-69289 1960-115

IDE 1959-117

For diagram(s), see printed CA Issue.

Higration and volatility are avoided by using esters of the general formula I, where R and Y are the same or different aryl or alkyl radicals or substituted radicals. Such esters are solvents for most thermoplastic materials. They are made by heating pentaerythritol (II) with POCl3 and phenols or alcs., or by heating pentaerythritol (II) with POCl3 and phenols or alcs., or by heating pentaerythritol (II) with POCl3 and phenols or alcs., or by heating phosphates in vacuo with OH compds. Thus 136 g. II and 500 ml. POCl3 were heated together on a steam bath. The residual POCl3 was distilled off in vacuo to give about 250 g. acid ester chloride (III), m. 241-5*. III (300 g.) and PhoH 220 were refluxed with J l. CH2Cl2 and 300 ml. EtJN. The CH2Cl2 was distilled and the residue extracted with a mixture of CH2Cl2 and H2O. The EtJN salt entered the H2O phase and the II phosphate ester dissolved in the CH2Cl2. Evaporation of the Bolvent left 300 g. I (R * Y * P * P) (IV). m. 201-2*. Similarly prepared were I (R * Y * 4-MECKH2) in (Irom lauryl alc.); the thick viscous oil I (R * Y * ECCH2CH2) (from monosthyl glycol); the viscous oil I (R * Y * ECCH2CH2) (from monosthyl glycol); the viscous oil I (R * Y * * CHCCCC6H4), m. 212*, (from p-chlorophenol). Cellulose triacetate (50 g.) was dissolved in iso-POH 6, CH2Cl2 300, and IV 10 dissolved in CH2Cl2 50 parts was added The solution was freed of bubbles by heating, then cooled and cast on a plate from which it was stripped when dry. The clear film was suitable for a photographic emulsion support. Similar films were made from IV and polystyrene and from IV and poly(vinyl chloride). The other esters described were also used to produce suitable films of good mech. properties.

J14-37-4-37-59-59-9

(Derived from data in the 7th Collective Formula Index (1962-1966))

17 714.97.4 57573.95.9 (Derived from data in the 7th Collective Formula Index (1962-1966)) 714-87-4 CAPLUS 2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-dichloro-, 3,9-dioxide (CA INDEX NAME)

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97575-98-9 CAPLUS
Phosphoric acid, ester with 3-(2-hydroxyethoxy)propionitrile, cyclic diester with pentaerythritol (7CI) (CA INDEX NAME)

PAGE 1-B

--- CH2 -- CH2 -- CN

4991-19-1P, Ethanol, 2-ethoxy-, phosphate, cyclic diester with pentaerythritol RL: FREN (Preparation) (preparation of) 4991-19-3 CAPLUS Phosphoric acid, cyclic diester with pentaerythritol, bis(2-ethoxyethyl) ester (SCI) (CA INDEX NAME)

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